

EXHIBIT T

ARISTA

Usability Comparison Study

EOS and NX-OS from the IOS User Perspective

David Heyman
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Overview

The purpose of this study was to gauge the level of adjustment required for a network engineer to transition from a familiar IOS platform to a NXOS and EOS platform. At all times during this study the starting point of observations is from that perspective. While this study cannot fully eliminate the role of opinion in the process, every attempt was made to evaluate without bias and render statistical representation rather than conjecture.

This study breaks down the adjustment factor into two components: Feature Comparison and the Detailed CLI Evaluations Tests.

Feature Comparison

The following feature comparison is based on the available documentation for the tested platforms. Not all features listed from the IOS 3650 platform are compared here – this is meant to be a general cross section of features.

Source:

http://www.cisco.com/en/US/docs/switches/lan/catalyst3560/software/release/12.2_44_se/configuration/guide/3560SCG.pdf

http://www.cisco.com/en/US/prod/collateral/switches/ps9441/ps9670/data_sheet_c78-461802.html

Performance

	NXOS	EOS
Auto MDIX	NO	NO
802.3x Flow Control	YES	YES
EtherChannel	YES	YES
PAgP/LACP Dynamic LAG	YES	YES
VRF Lite	CHECK	NO
CGMP/IGMP snooping	YES	YES
IGMP report suppression	NO	NO
IGMP querier	YES	YES
IGMP Helper	NO	NO
Multicast VLAN Registration (MVR)	NO	NO
IGMP Filtering	NO	NO
IGMP Throttling	NO	NO
Web Cache Communication Protocol (WCCP)	NO	NO

Management

	NXOS	EOS
Cisco Network Assistant / Net Mgmt Platform	NO	NO
CLI	YES	YES
Cisco Networking Services (CNS)	NO	NO
Embedded GUI device manager	NO	NO

Manageability

	NXOS	EOS
Autoconfiguration via DHCP	NO	NO
DHCP relay	NO	YES
DHCP server	NO	NO
CDP/LLDP	YES	YES
NTP	YES	YES
Source Specific Multicast (SSM)	NO	NO
In band management via SSH/Telnet	YES	YES
OOB port	YES	YES
SCP	YES	YES
HTTP client/server	NO	NO
SNMP	YES	YES

Availability/Redundancy

	NXOS	EOS
HSRP	NO	NO
UDLD	NO	NO
802.1D STP	YES	YES
PVST	YES	NO
RPVST	YES	NO
MSTP	YES	YES
Portfast	YES	YES
BPDU Guard	YES	YES
BPDU Filtering	NO	NO
Flex Link	NO	YES

VLAN

	NXOS	EOS
VLAN Query Protocol (VQP)	NO	NO
ISL/802.1q trunking	YES	YES
VLAN Trunking Protocol (VTP)	NO	NO
PVLANS	YES	NO

Security

	NXOS	EOS
MAB aging timer	NO	NO
Password protected access	YES	YES
Multilevel security	NO	NO
Static MAC addressing	YES	YES
L2 ACL	YES	NO
L3 ACL	YES	NO
802.1Q tunnelling	NO	NO
802.1x port based authentication	NO	NO
TACACS+	YES	YES
RADIUS	YES	4.2
Kerberos	NO	NO
SSL 3.0	NO	NO

QOS

	NXOS	EOS
QOS	YES	NO

Layer 3

	NXOS	EOS
RIP v1 and v2	NO	NO
OSPF/EIGRP	NO	NO
BGP v4	NO	NO
Policy Based Routing	NO	NO
Static IP routing	NO	YES
ECMP	NO	YES

Monitoring

	NXOS	EOS
LEDs	YES	YES
SPAN / Port Mirroring	YES	YES
RSPAN / Remote Port Mirroring	NO	NO
Syslog facility	YES	YES
Layer 2 traceroute	NO	NO
Digital Optical Monitoring (DOM)	NO	NO

Detailed CLI Testing

CLI Testing Explanation

For CLI testing, tests were comprised of ‘actions’, a term representing a group of CLI commands that allow configuration and operation of a feature. In each case, the action was first performed on the IOS platform, then on the NXOS and EOS platforms. The experience of performing the action on the target platforms was broken down into four categories, and rated on a 1 – 5 scale.

Support of action on platform – Can the IOS supported action be performed on the target platform , and with what level of functionality?

Score	Explanation
1	The action is not supported
2	The action is supported with less functionality than IOS
3	The action is supported with the same functionality as IOS
4	The action is supported with more functionality than IOS
5	The action is supported with significantly more functionality than IOS

Syntax – How similar is the user CLI input to perform this action? First attempt will be to use the exact IOS syntax on the target platform. If this fails, the platform will be judged on the level of deviation from the IOS standard.

Score	Explanation
1	The syntax is completely different than IOS for this action
3	The syntax is similar to IOS for this action, but there are differences
5	The syntax for this action is identical to IOS

Complexity – How complex is the action on the other platforms in comparison to IOS?

Score	Explanation
1	The action is significantly more complex than IOS
2	The action is somewhat more complex than IOS
3	The action is identical in complexity to IOS
4	The action is somewhat less complex than IOS
5	The action is significantly less complex than IOS

System Help – The first component of this is the ? test. What level of clear supporting information for this action is available from the CLI? Additional credit will be given here for supportive behavior or supportive auxiliary commands.

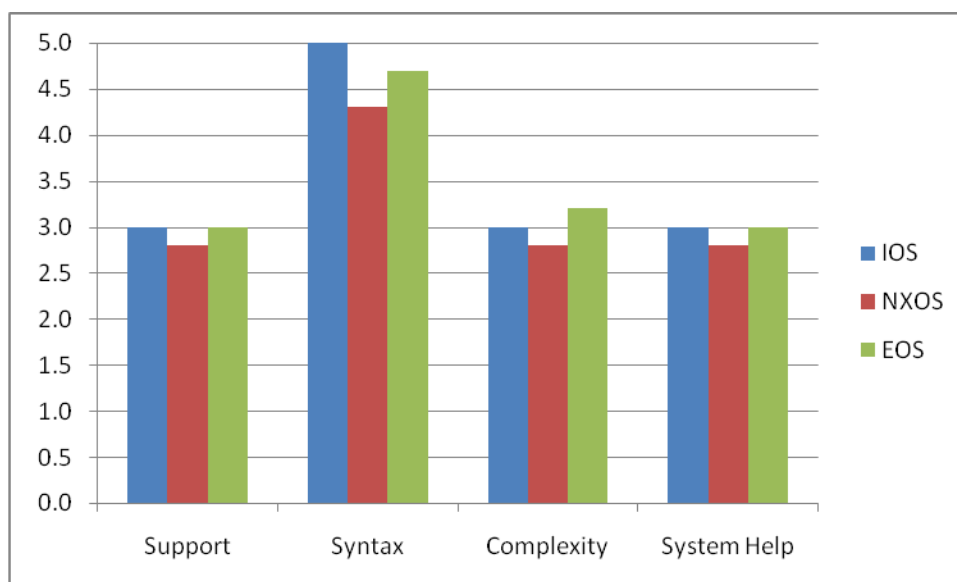
Score	Explanation
1	There is no assistance for this action
2	There is less clear assistance for this action than in IOS
3	The level of assistance for this action is identical to IOS
4	There is more clear assistance for this action than in IOS
5	There is significantly more assistance for this action than in IOS

CLI TESTING SCORES

The tests performed below represent a cross section of likely configuration and diagnostic actions. In each case, an attempt was made to use the same syntax and functionality on the NXOS and EOS platforms as on the IOS platform. Deviations both positive and negative were noted. All tests were chosen before any tests were run.

Both the NXOS and EOS platforms bring small but useful advances to the CLI usage. These include the ability to run diagnostic commands from configuration mode and the ability to specify ranges of interfaces.

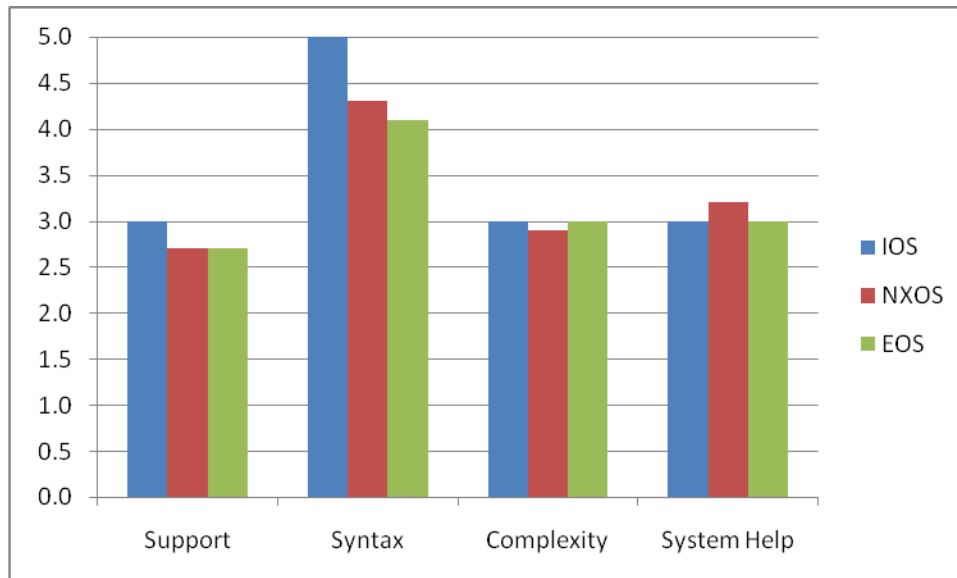
Overall Performance



Commentary: Overall, success in adjustment is a factor of how well the platform meets or exceeds the behavior expected by the IOS user. Both platforms performed well, and the tests showed that the level of adjustment for an IOS platform to either would be small.

That stated, the EOS platform did clearly outperform the NXOS platform in the larger picture, and a transition from IOS to EOS would likely be smoother and require less adjustment. There were multiple instances where NXOS deviated significantly from IOS syntax and representation. While EOS maintained a similar level of innovation in comparison to NXOS, the Arista Networks platform contained no significant deviation from established IOS norms.

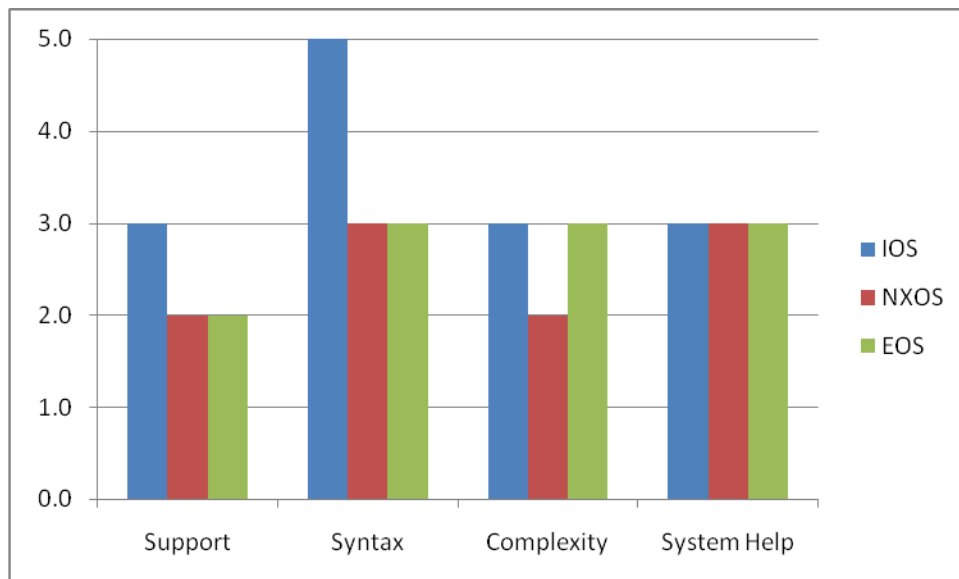
Basic Startup and Configuration - Overall Scores



Commentary: This group of tests simulated basic administrative configuration that may be performed when the switch is first put on the network. These 'out of box' commands have the potential to be the network engineer's first actual experience with the CLI of the platform. Initial impressions start here. Overall, both platforms are slightly off the pace of IOS familiarity. Deviations here were mostly in the realm of syntax and in lesser support of user access management.

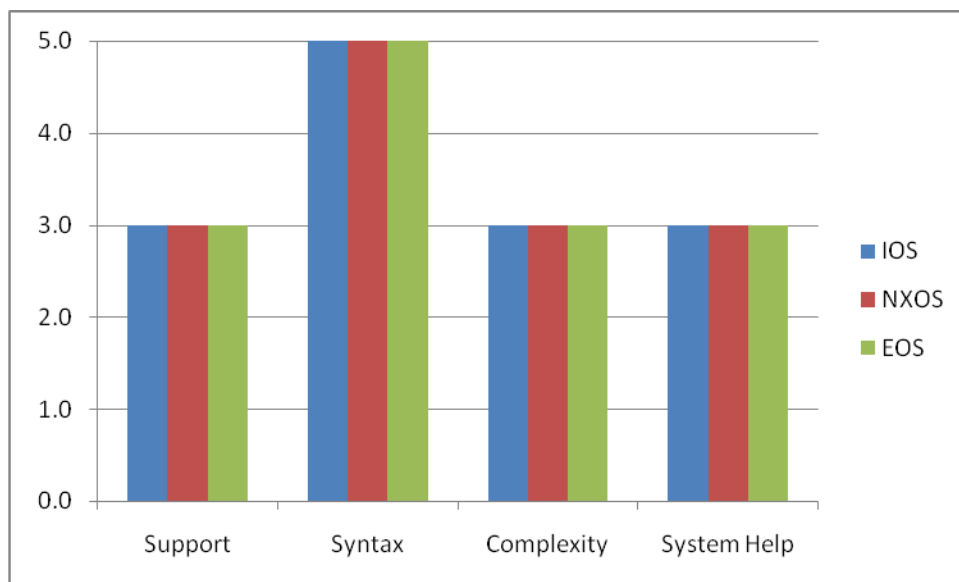
Basic Startup and Use – Individual Tests

1.1 User accounts and passwords



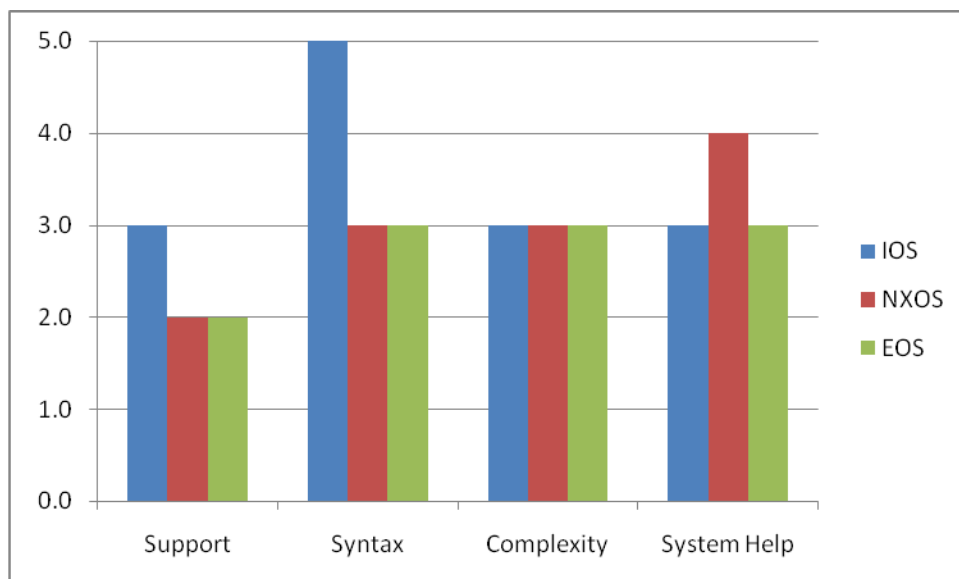
Commentary: Both NXOS and EOS are missing options around controlling the user's access, including *access-class*, *privilege level*, and *no password* (NXOS only). NXOS does not permit the use of the *secret* keyword, whereas EOS does not permit the use of *password* – both are usable in IOS. NXOS has a password requirement that seemed overbearing and added complexity.

1.2 Hostname



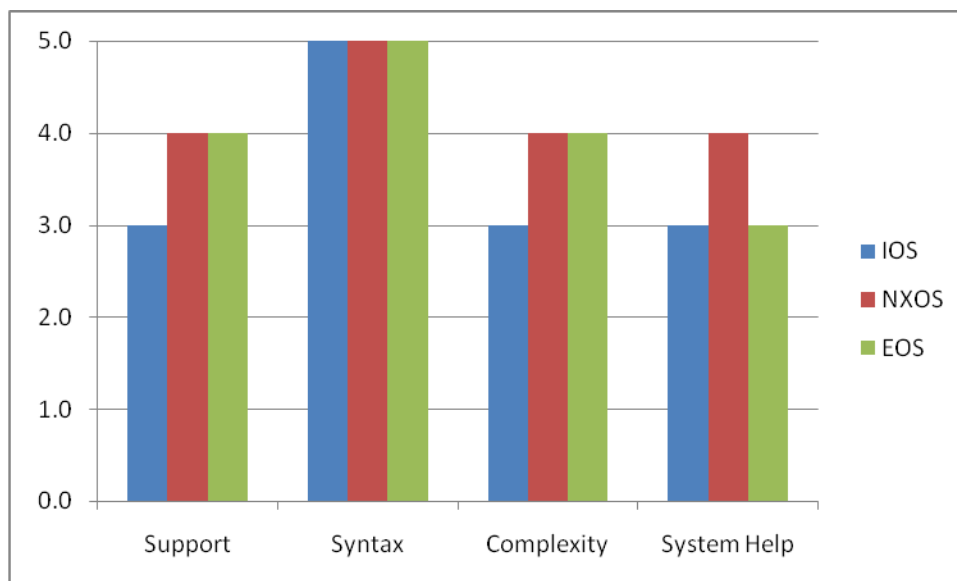
Commentary: None. This action was seamless on both platforms.

1.3 Banners



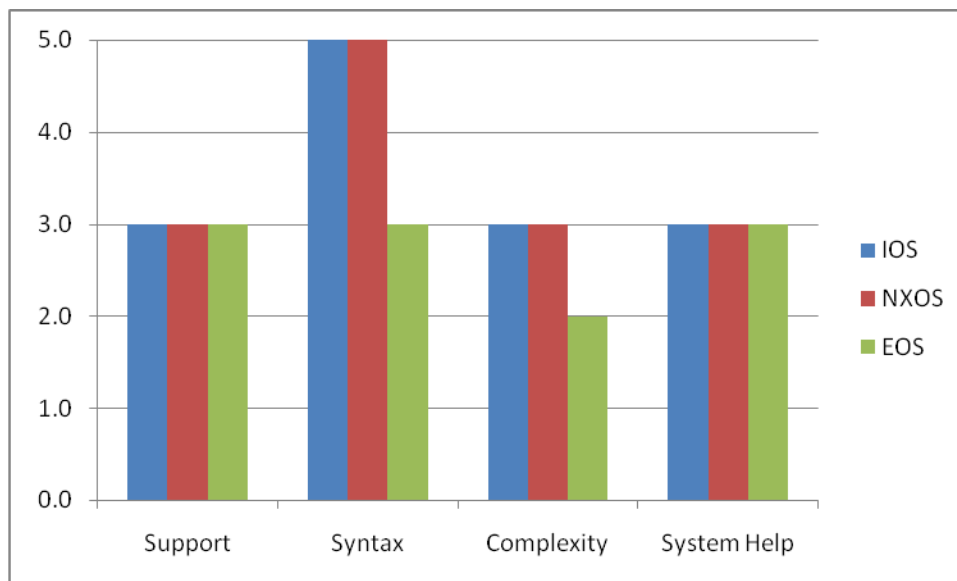
Commentary: Both platforms demonstrated less banner support and syntax deviation from IOS. IOS allows for 6 banner types, EOS allowed 2 (login and motd) and NXOS only one (motd). Each platform had the same syntax for beginning the process of editing the banner, but all were different in how the actual editing was done and exited. NXOS has a supporting command to show the banner (*show banner motd*), something neither IOS or EOS offer. (Bug filed: 6808)

1.4 Default IP route



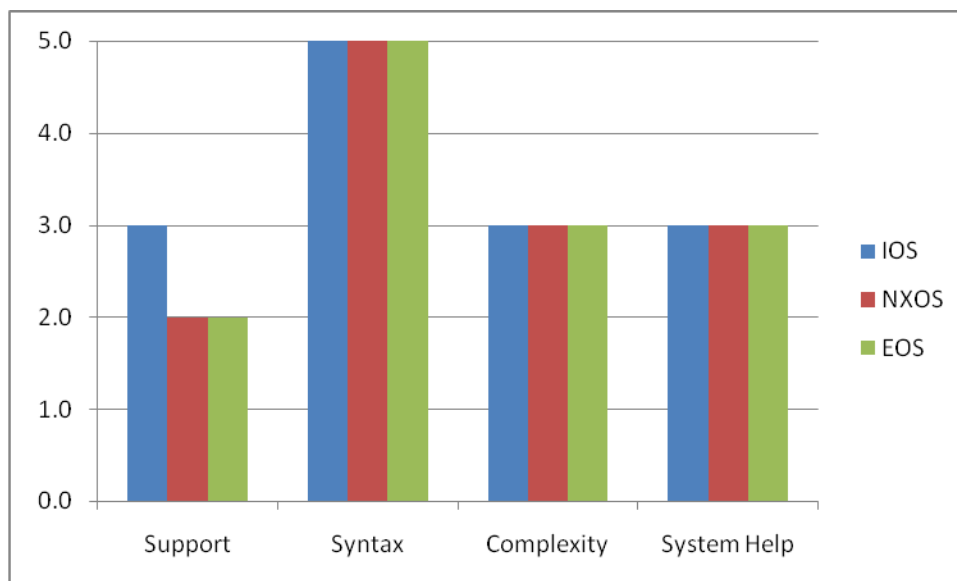
Commentary: Both platforms improve on the IOS experience with the added support of CIDR, which adds functionality and reduces complexity. NXOS gains additional credit for specifically preventing and notifying a user if they attempt to set a local IP as the default gateway. EOS will allow such an IP to be configured, though it will not be installed in the routing table. (Bug 6738)

1.5 Setting the clock



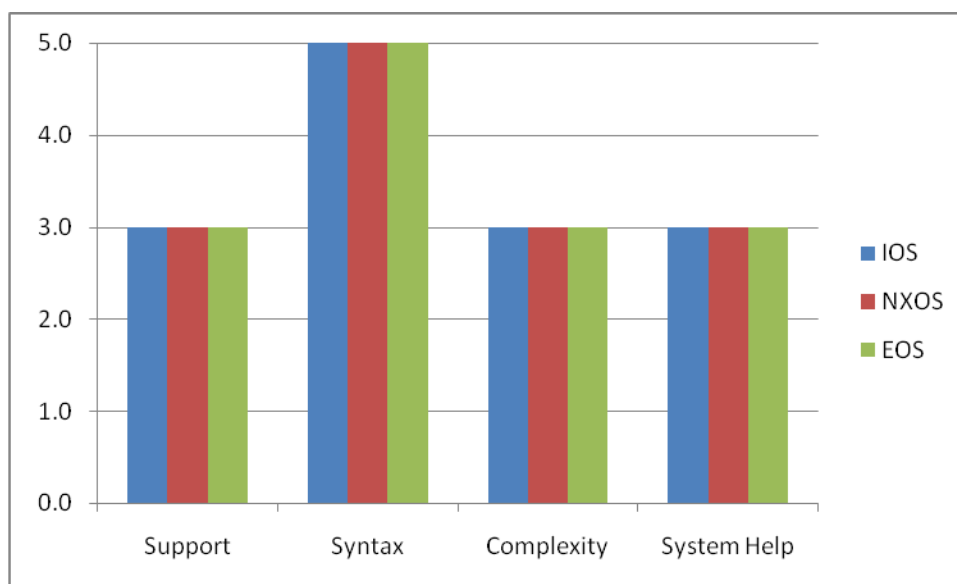
Commentary: Syntax is identical between IOS and NXOS. NXOS also echoes the time set back to the user, which is a nice touch. EOS requires a change in syntax, using slashes between dates instead of spaces. (Bug 6739)

1.6 Configuring NTP



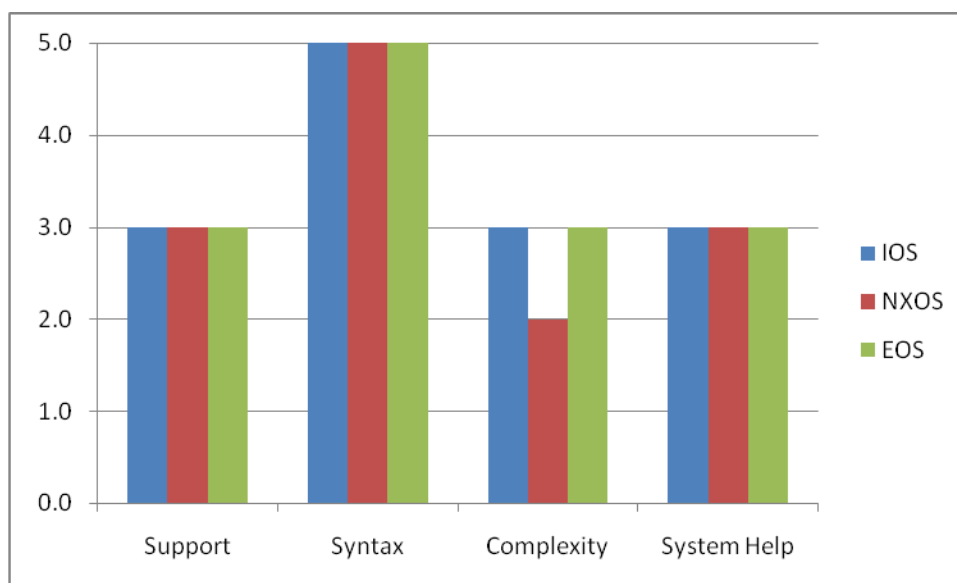
Commentary: Both NXOS and EOS had fewer NTP options than IOS, including authentication and access control.

1.7 Show version



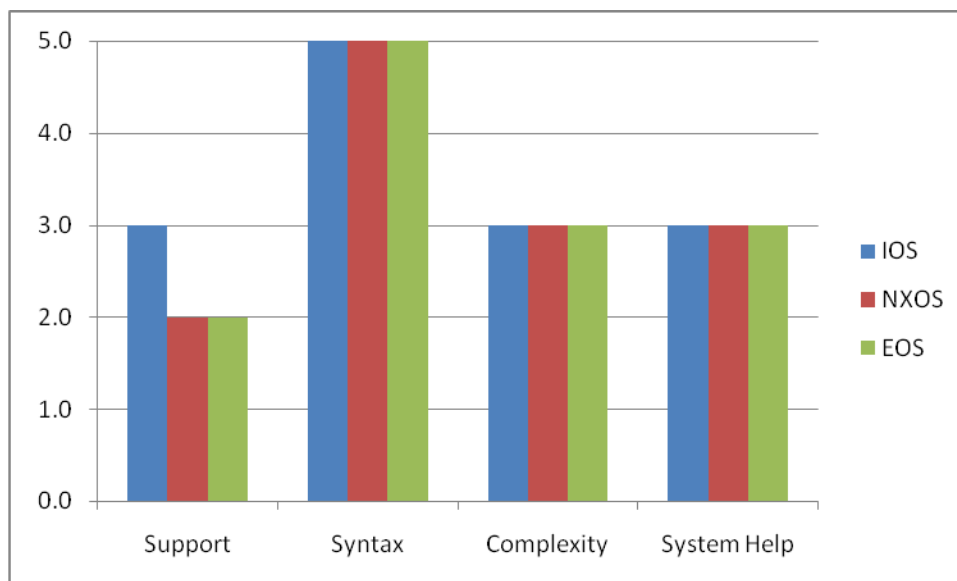
Commentary: The outputs of all three are quite different, but all provide the most basic software and hardware version information at a minimum. The EOS version is the easiest to read. Both IOS and EOS clearly identify the chassis serial number.

1.8 Show running-configuration



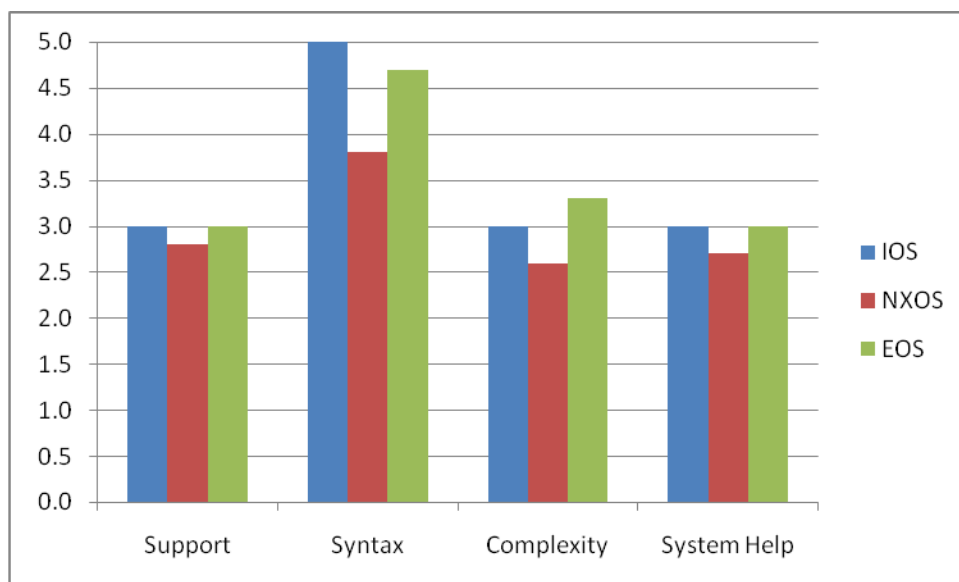
Commentary: There are ordering differences between IOS and EOS/NXOS. The NXOS configuration lacks any form of separation (lacking the ! separator that IOS and EOS use), which makes the configuration much more difficult to read.

1.9 Show users



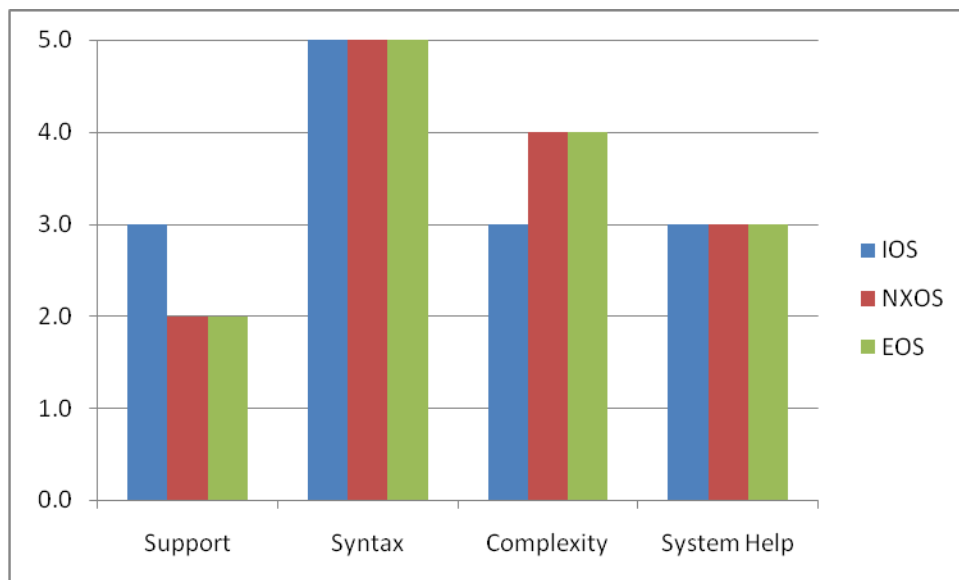
Commentary: Syntax and output on all three platforms is almost identical. IOS does have the option of displaying inactive users, which EOS and NXOS do not.

Layer 2 Configuration and Diagnostics – Overall Scores



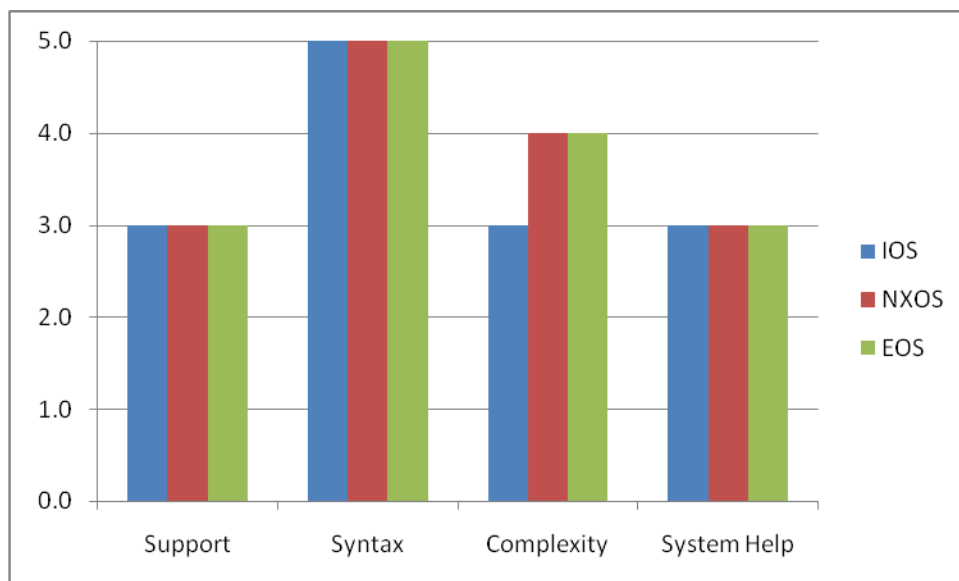
Commentary: The NXOS platform scores were significantly influenced by the inability to configure a SVI, as well as the NXOS' different approach to representing mac address-table information.

2.1 Show interface



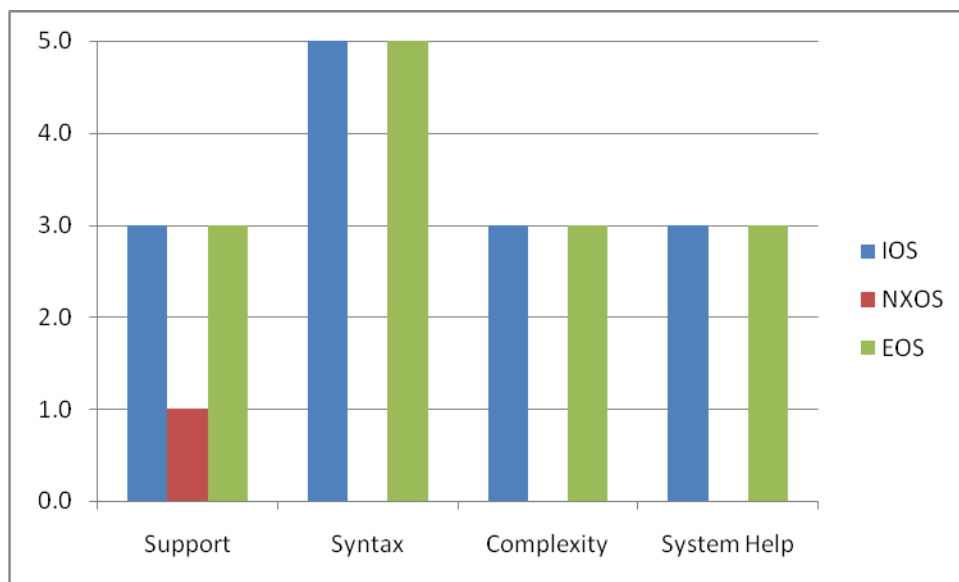
Commentary: Both NXOS and EOS outputs have fewer counters for error than IOS. However, both NXOS and EOS represent the data in a much easier to read fashion, reducing complexity.

2.2 Basic VLAN configuration



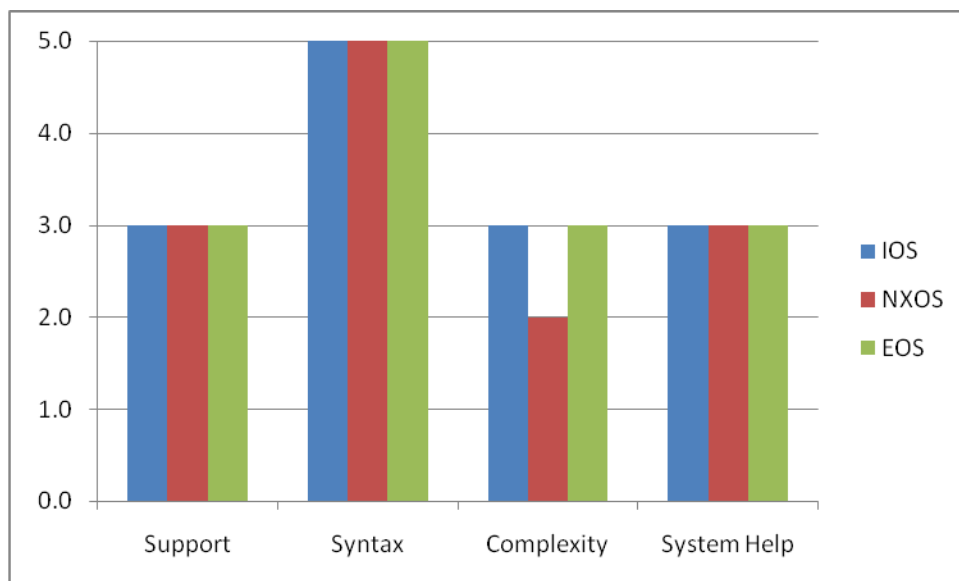
Commentary: The syntax for VLAN creation is identical across all three systems. The ability to create VLANs as a range in NXOS and EOS reduces complexity.

2.3 Configure a switched virtual interface



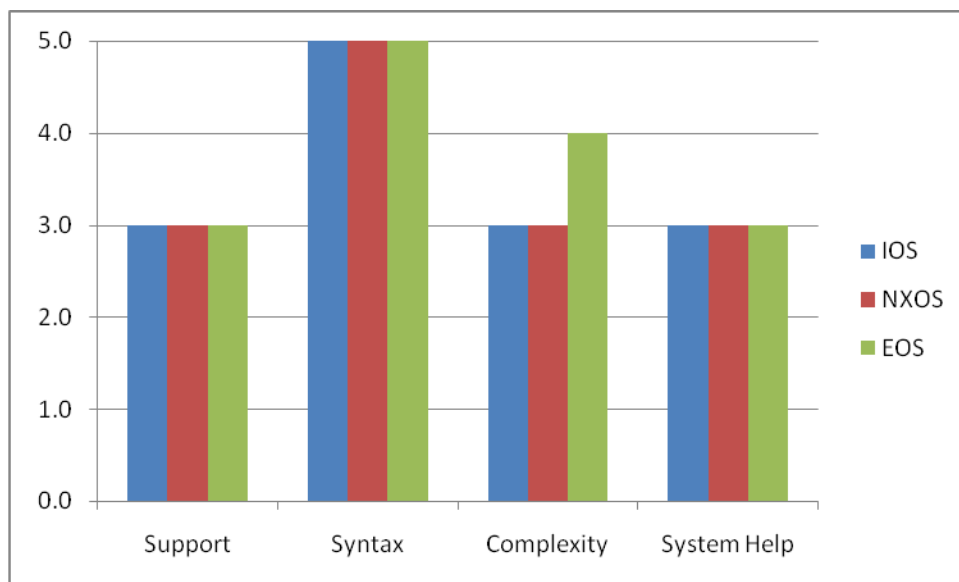
Commentary: This option is not available in NXOS. Configuration on EOS is identical to IOS.

2.4 Add an interface to a VLAN



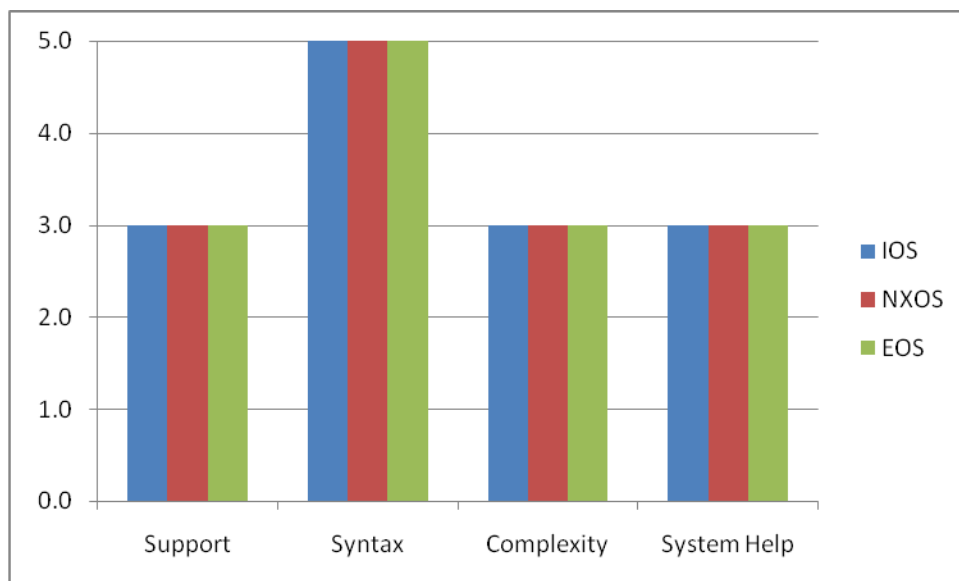
Commentary: Both IOS and EOS will auto create the VLAN the interface is being added to if it does not exist. NXOS forces creation of the VLAN first.

2.5 Show VLAN



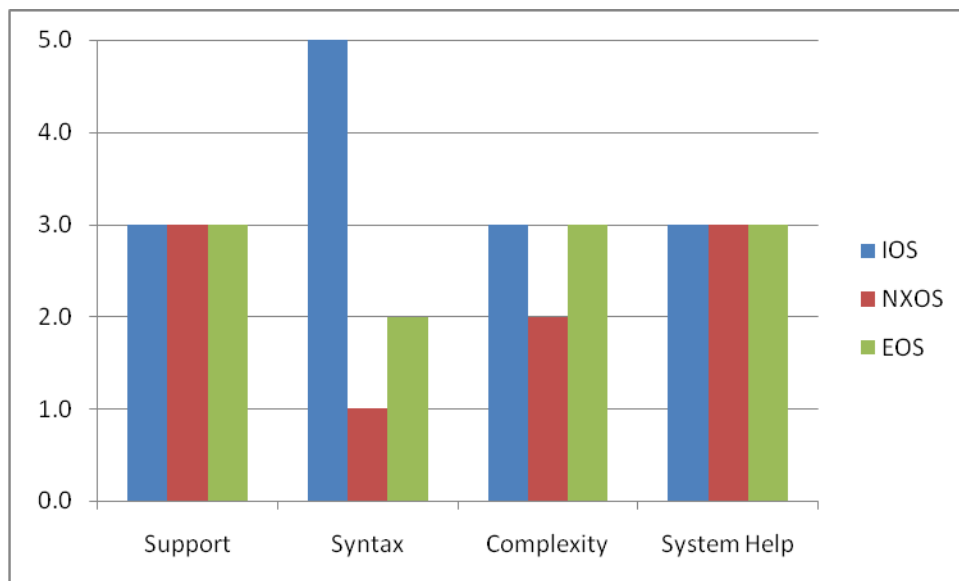
Commentary: Show vlan id is supported by all three platforms. Show vlan is also supported by EOS, reducing a step.

2.6 Trunk creation



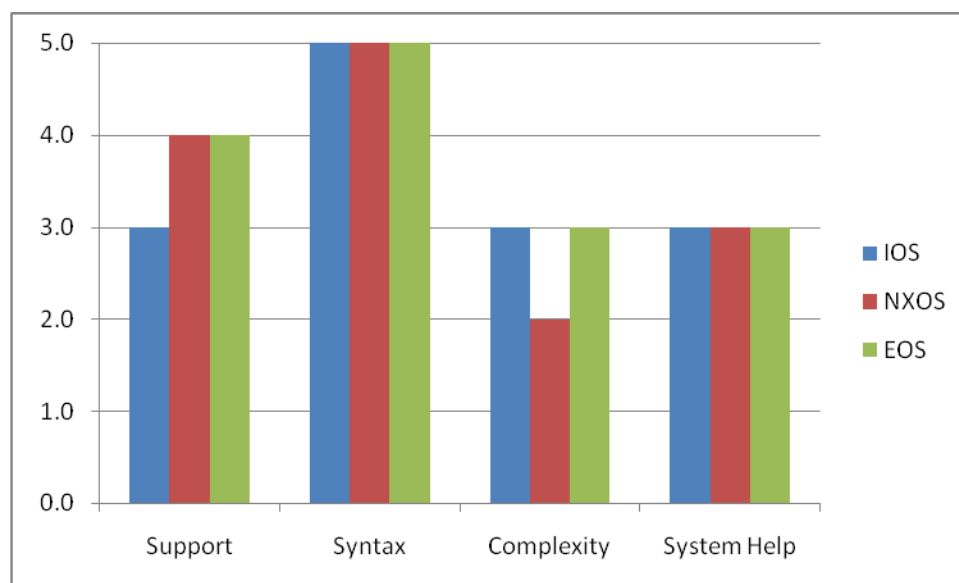
Commentary: The process for creating a trunked interface and selecting allowed VLANs is identical across all three platforms.

2.7 Show mac address table



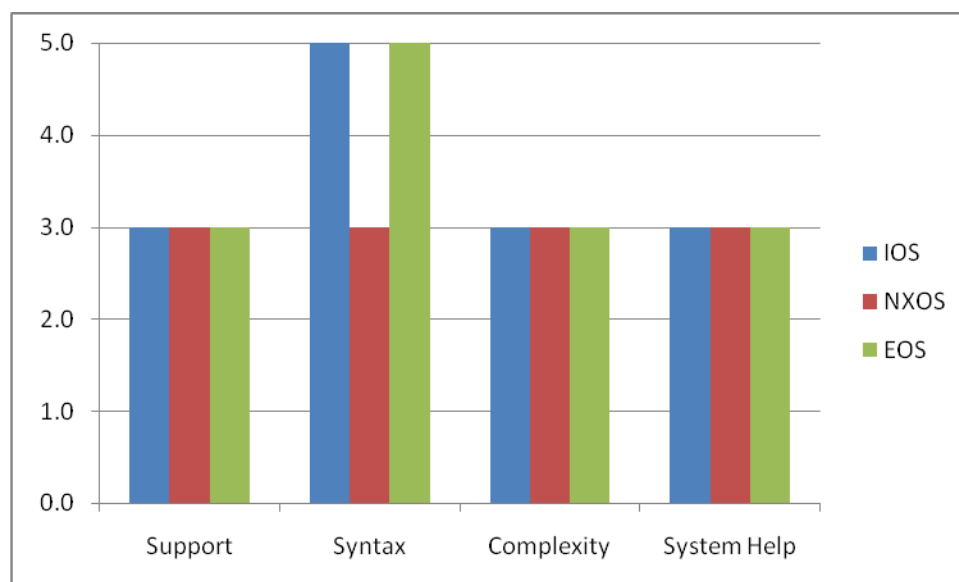
Commentary: The syntax is slightly different on EOS, as EOS requires a – between ‘mac’ and ‘address’. The syntax is radically different in NXOS to obtain the same information, the command being show mac dynamic at a minimum.

2.8 Configure flow control



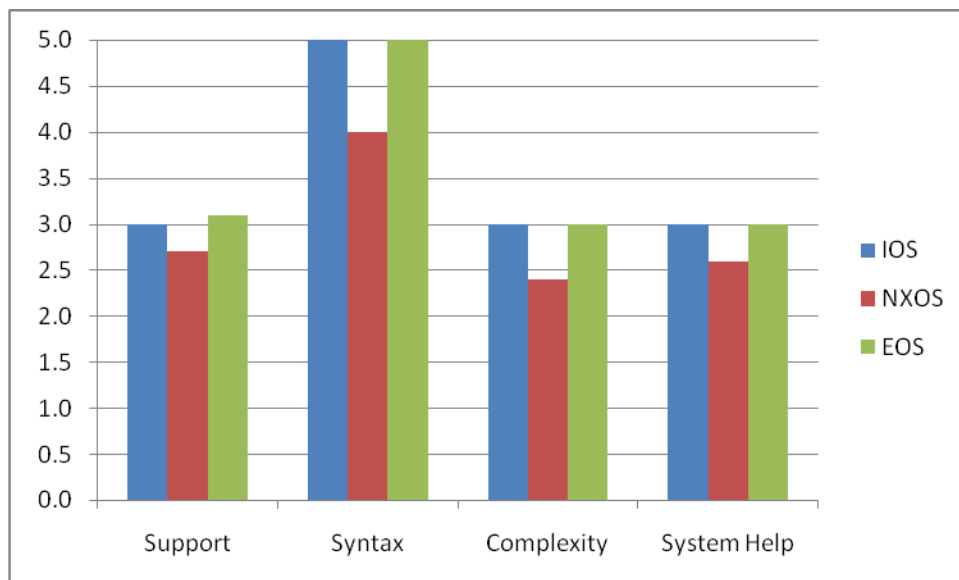
Commentary: Both NXOS and EOS allow the additional option of send flow control. IOS and EOS also allow for a 'desired' setting, NXOS does not.

2.9 Show flow control



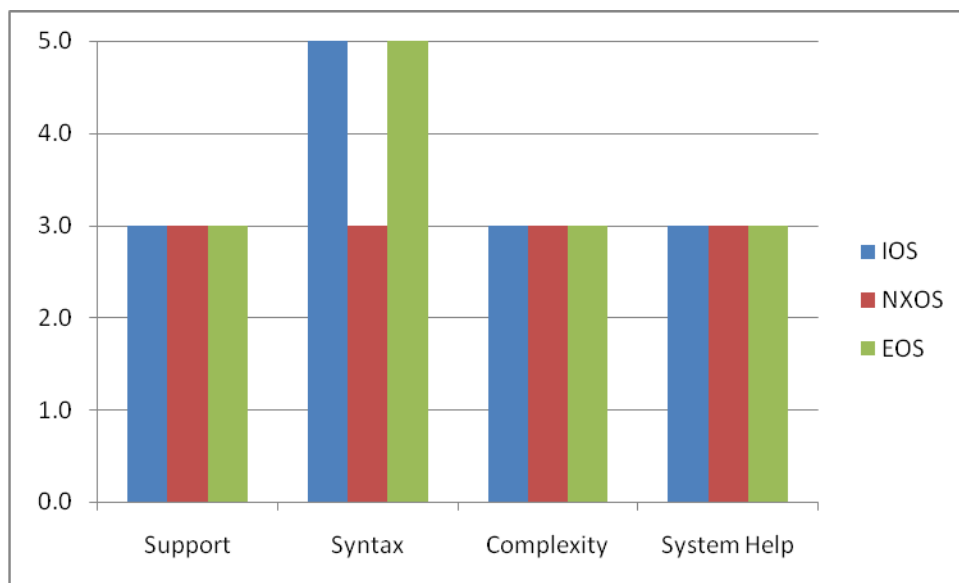
Commentary: All three platforms produce the same output in response to 'show interface flowcontrol'. Both IOS and EOS also support 'show flowcontrol', which produces the same output. NXOS does not support this option.

Switch management – Overall Scores



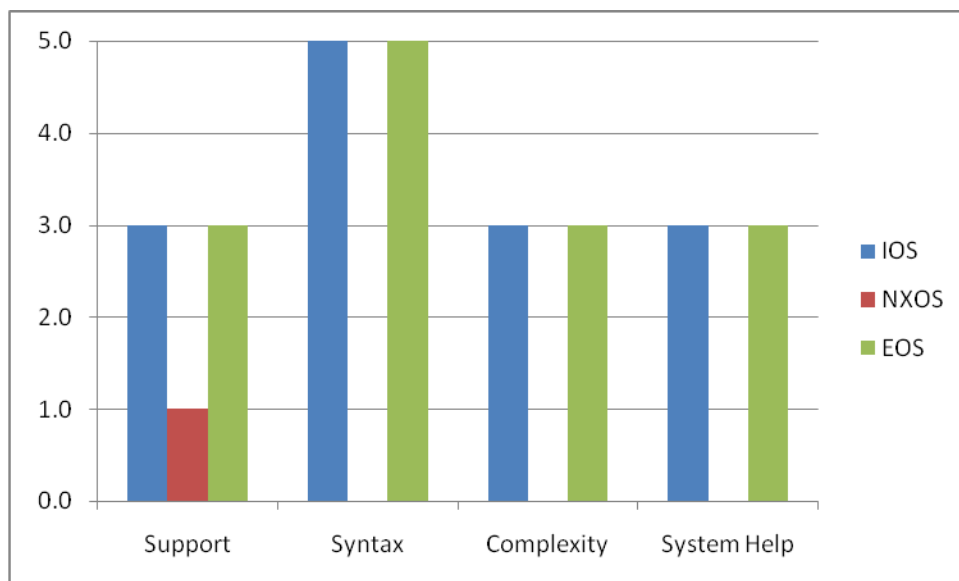
Commentary: NXOS differences in how TACACS and logging are configured resulted in a lower score than EOS for this section.

3.1 Configure a logging host



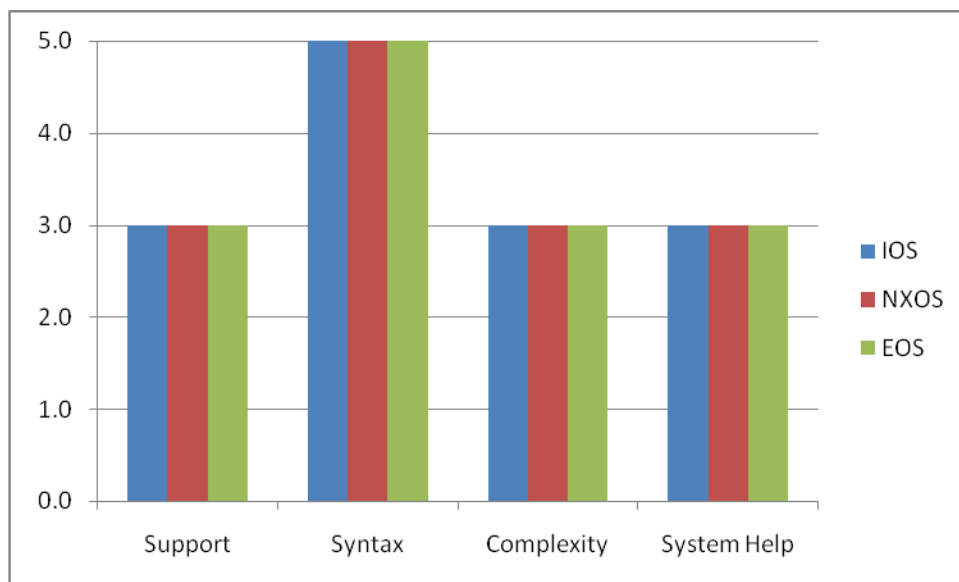
Commentary: Process is identical on IOS and EOS. NXOS uses the command 'logging server' instead of host.

3.2 Change the log buffer size



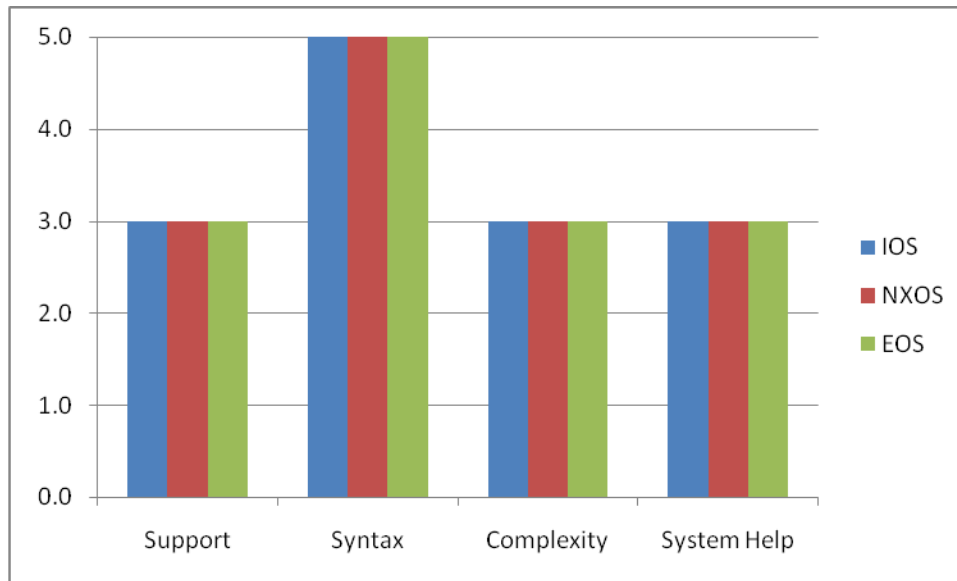
Commentary: This action did not seem to be supported in NXOS. Syntax and response on EOS was identical to IOS.

3.3 Configure a SNMP community



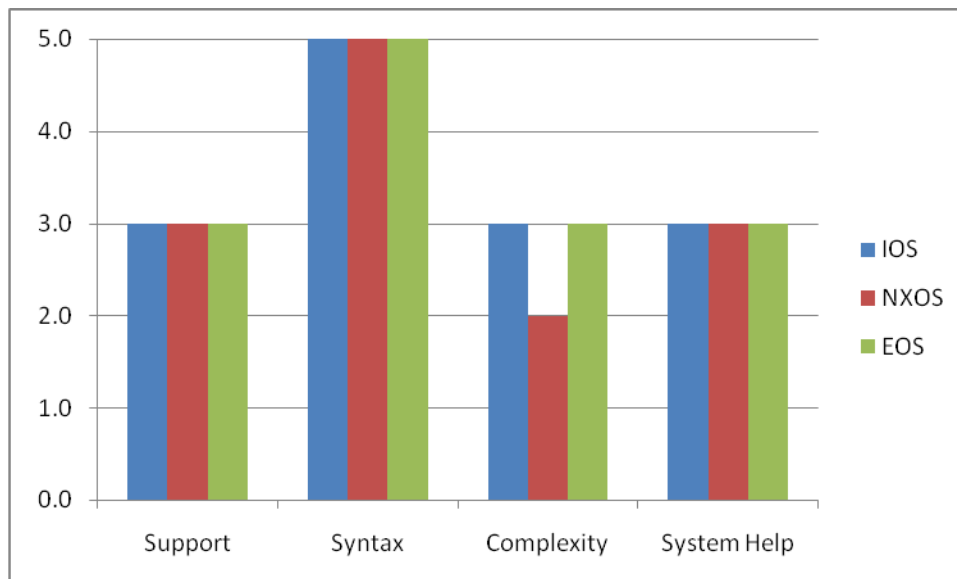
Commentary: This action was identical across all three platforms.

3.4 Add a SNMP server



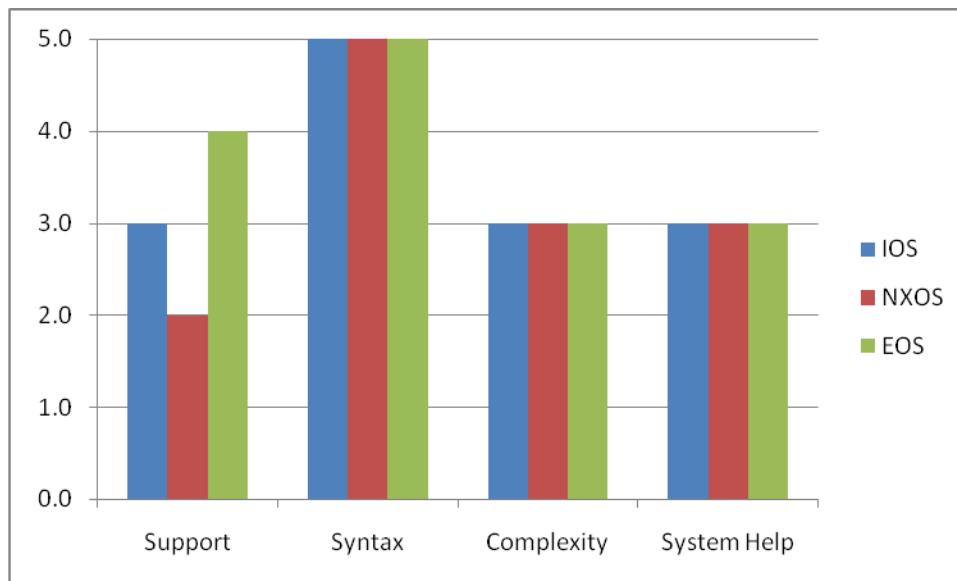
Commentary: This action was identical across all three platforms.

3.5 Add a TACACS+ server



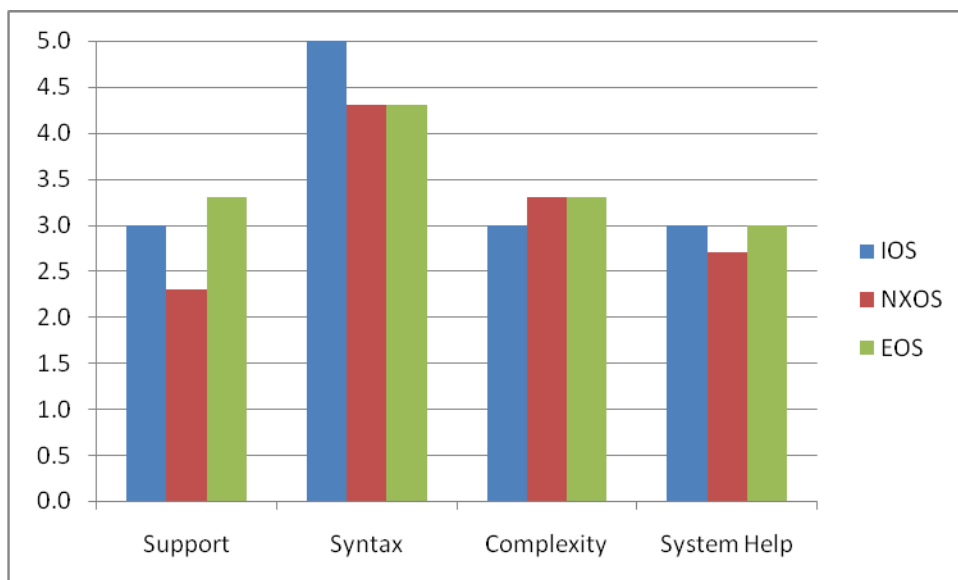
Commentary: Performance of this action on EOS was identical to IOS. In NXOS, TACACS+ had to be enabled before this action could be performed.

3.6 Show tacacs



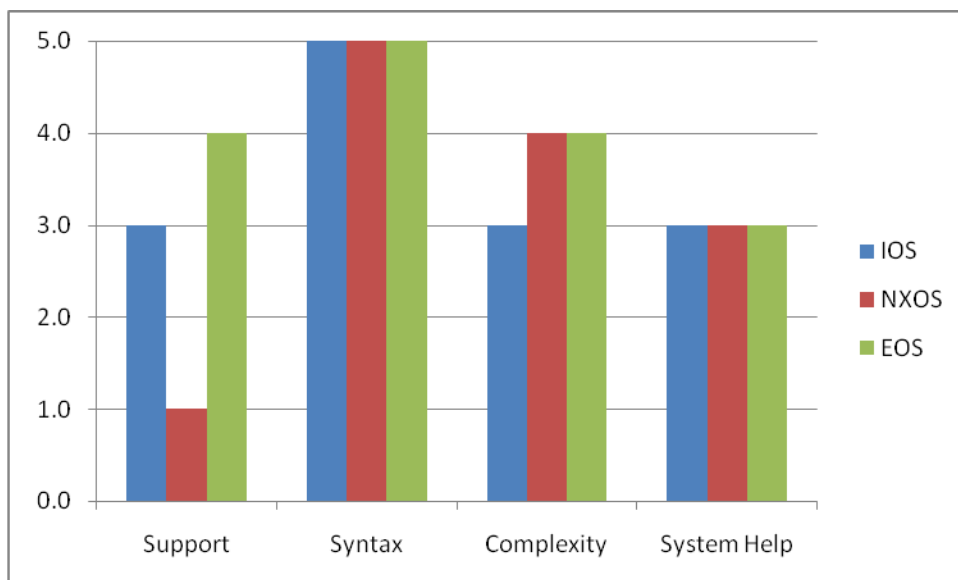
Commentary: The NXOS output contains much less information than the IOS output. The EOS output contains all IOS information plus additional counter clearing information.

IP Routing – Overall Scores



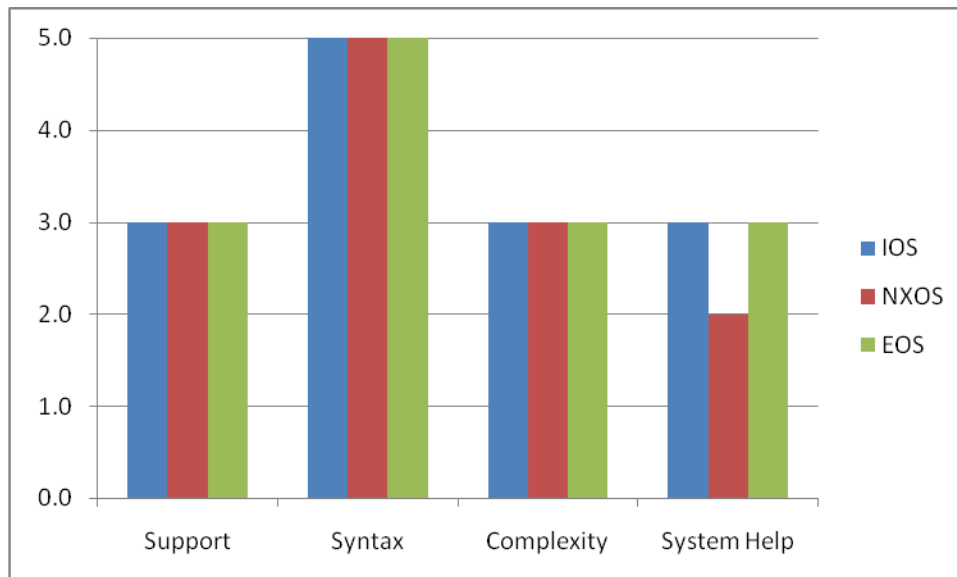
Commentary: NXOS scores are lower due to an inability to set an IP route beyond a default gateway.

4.1 Static IP Routing



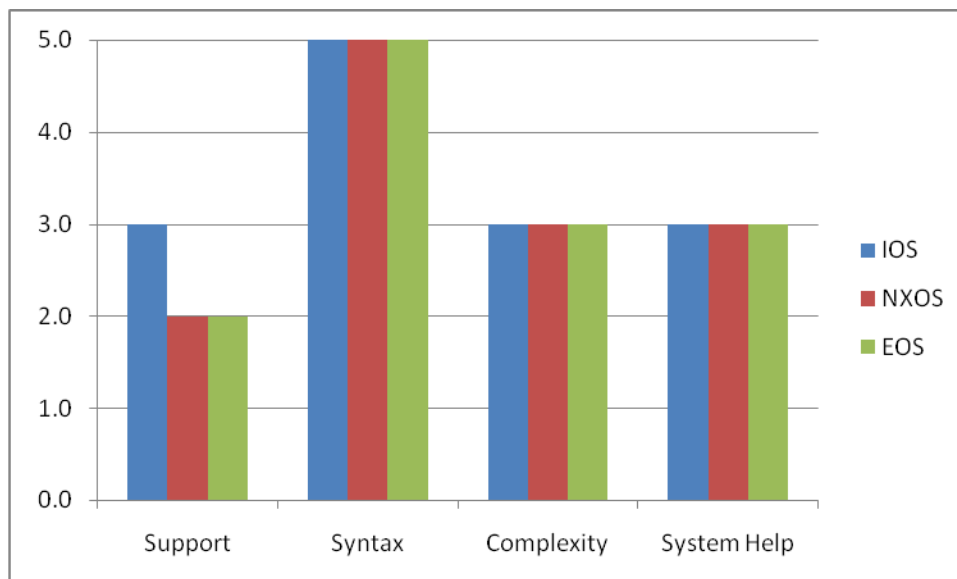
Commentary: Static routing is only supported on the NXOS to the extent of setting a default gateway, not for general static routing purposes. IOS and EOS allow for multiple static routes to multiple gateways, as well as ECMP support. EOS and NXOS allow for CIDR when configuring addresses.

4.2 Show ip route



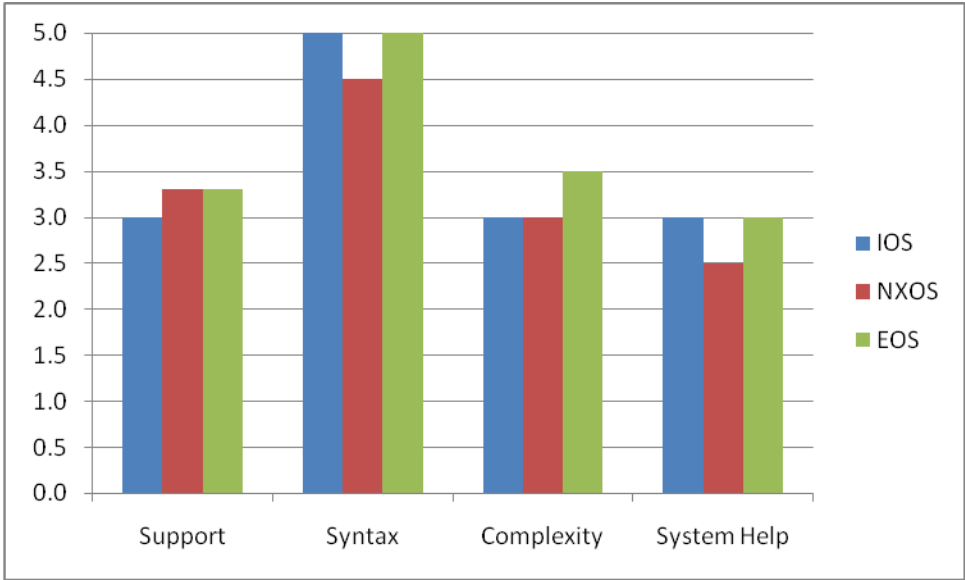
Commentary: Syntax and representation is identical between IOS and EOS. NXOS syntax is the same, but the representation of the routes is different and is missing the coding that clearly identifies routes as connected, static, etc.

4.3 IP Connectivity test with ping



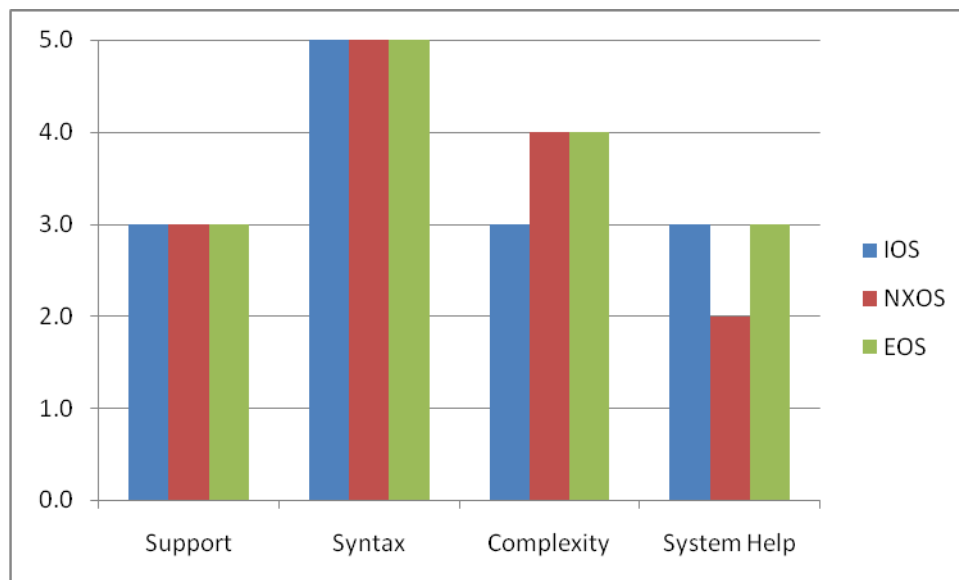
Commentary: Neither NXOS nor EOS have as many ping options as IOS. Both represent the test itself in a format different from IOS, with EOS being more similar. Complex ICMP options are available via the Arista UNIX shell, but that is outside the scope of this test.

Link Aggregation – Overall Scores



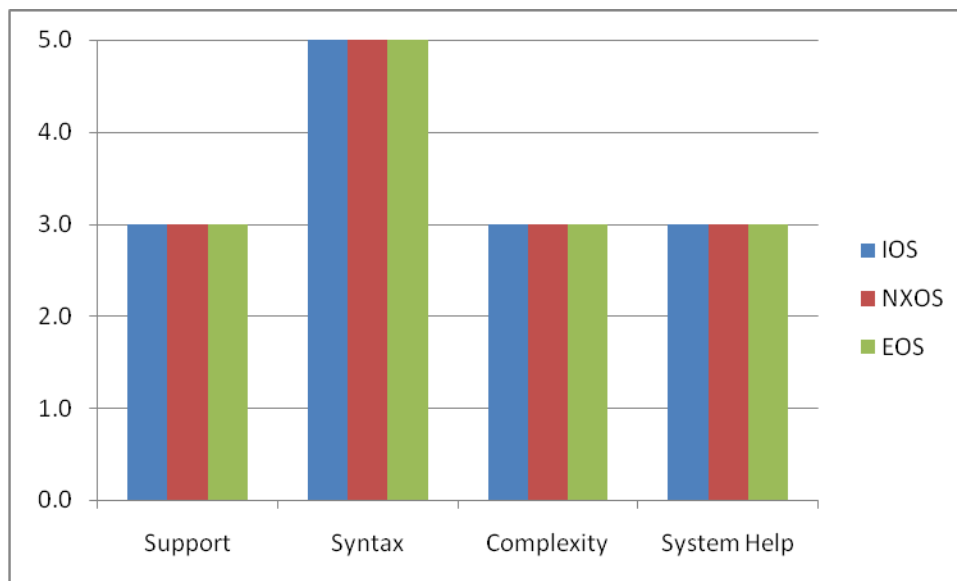
Commentary: Both NXOS and EOS have slightly more diagnostic data available than IOS for LACP troubleshooting. NXOS differs in syntax and the requirement to enable the LACP process.

5.1 Configure static LAG



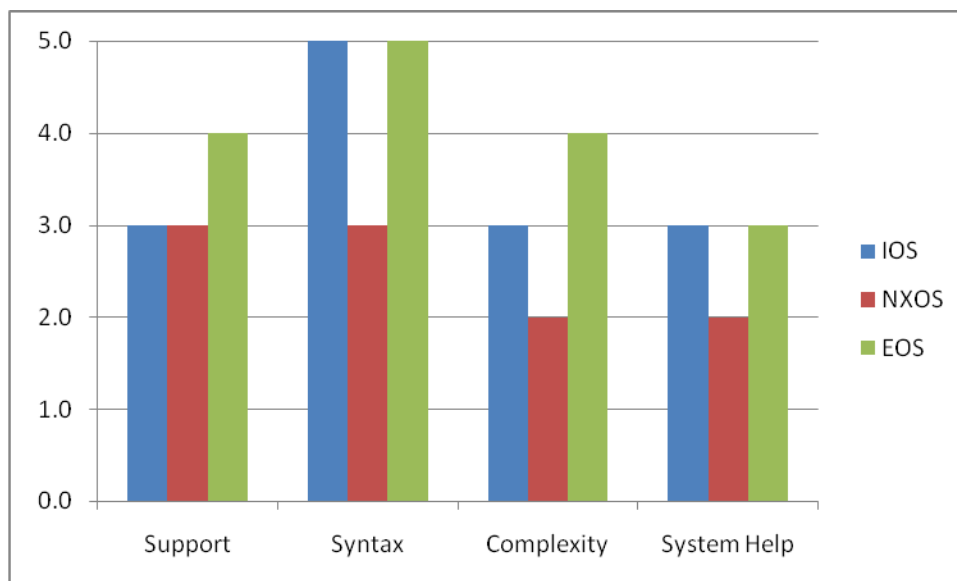
Commentary: Range support on EOS and NXOS is a plus. IOS explains the actions of 'active/passive' more clearly than EOS or NXOS. NXOS does not log the state of the port channel coming up.

5.2 Show port-channel



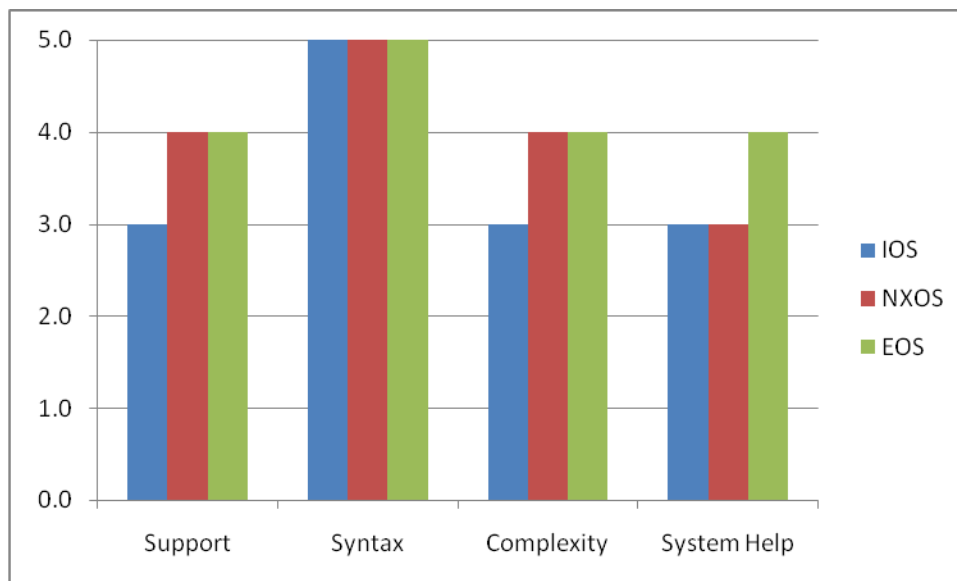
Commentary: This action is identical across all three platforms.

5.3 Configure dynamic port-channel using LACP



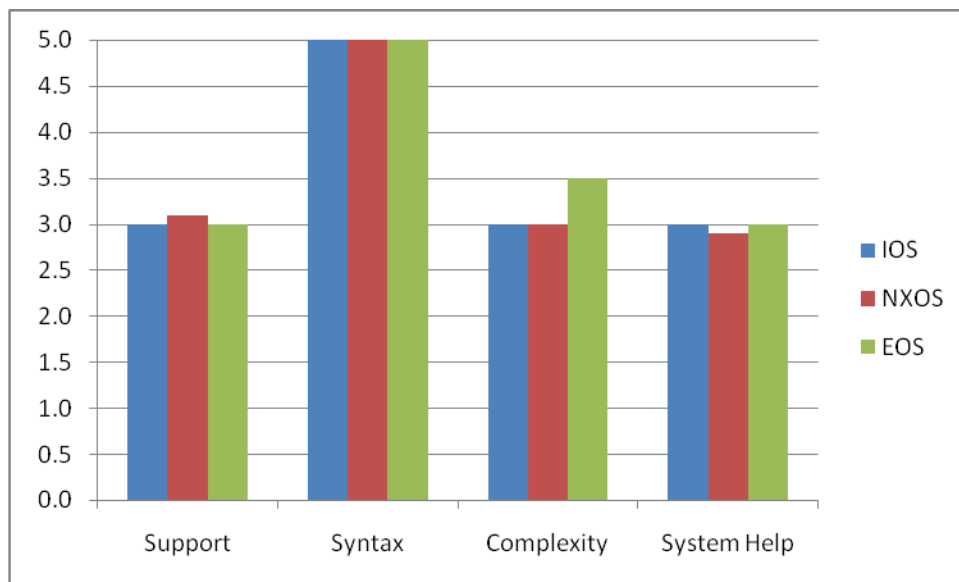
Commentary: The LACP process must be started via a separate command on NXOS to configure LACP. This solution was difficult to trace, as the error refers to LACP as a 'process' but the command to start LACP refers to it as a 'feature'. As before, the range support in NXOS and EOS makes configuration easier. Only EOS allows the setting of a short or long timeout.

5.4 Show LACP neighbor



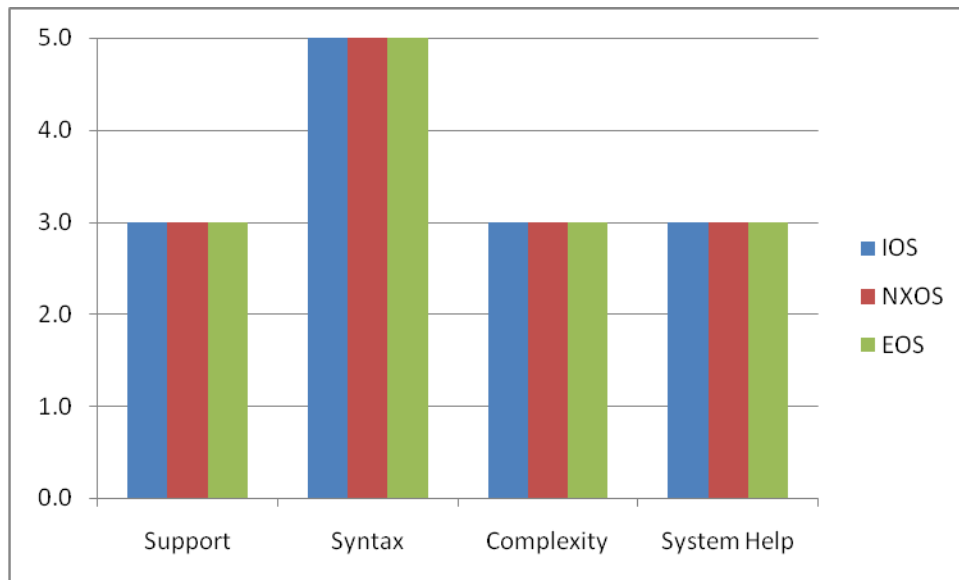
Commentary: Both NXOS and EOS display more LACP neighbor information than IOS. The NXOS information is displayed in a less traditional format, with the EOS representation more closely following the IOS model.

Spanning-tree – Overall Scores



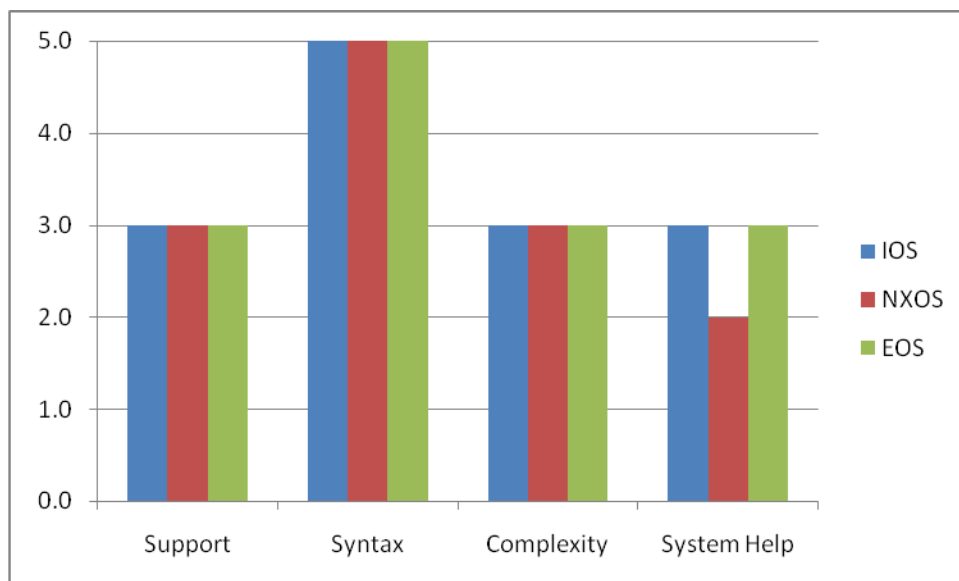
Commentary : Both platforms give strong IOS-like performances in the spanning-tree tests. Moving from IOS to NXOS or EOS would require little to no adjustment from a spanning-tree configuration perspective.

6.1 Set STP interface port cost



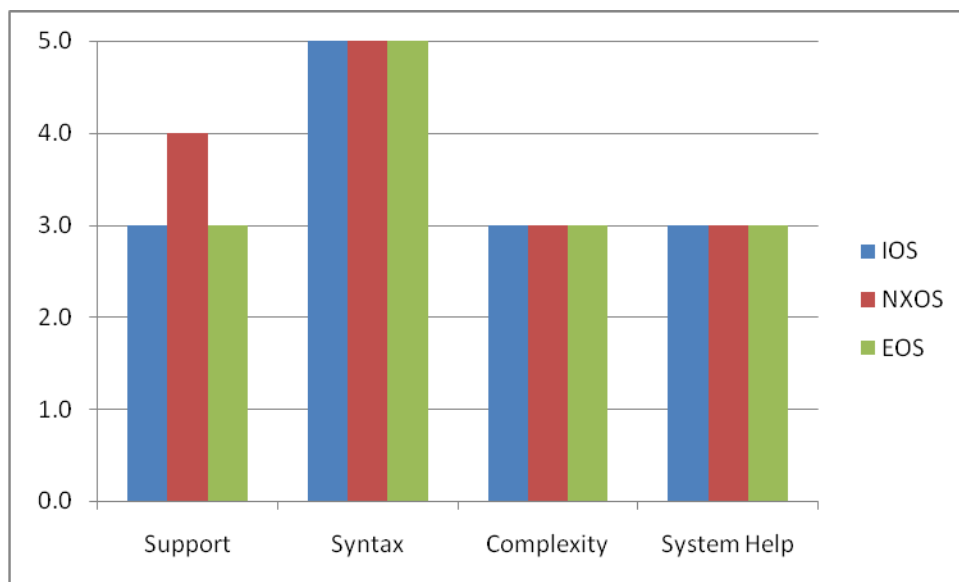
Commentary: Support for this action is identical across all three platforms.

6.2 Set an interface for portfast



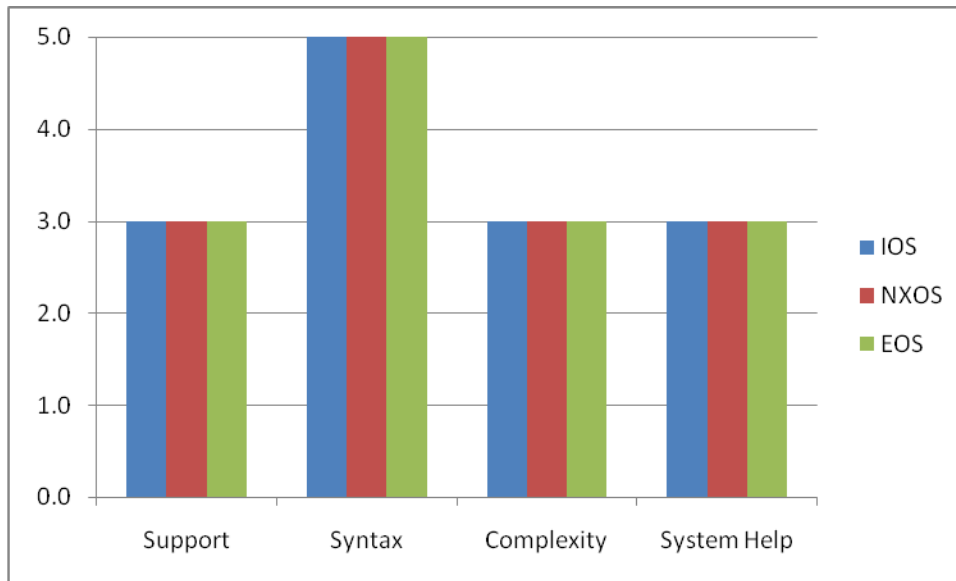
Commentary: Features and syntax are identical across all platforms. Similar to IOS, EOS issues a warning when configuring portfast – NXOS does not.

6.3 Set an interface link type



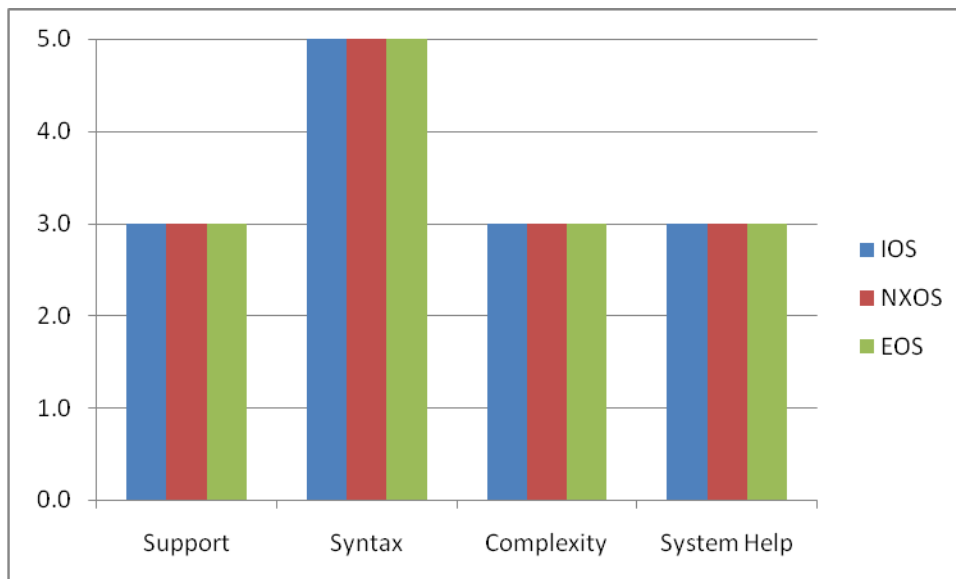
Commentary: NXOS contains the option to auto set the link type based on the interface media.

6.4 Set bpduguard on an interface



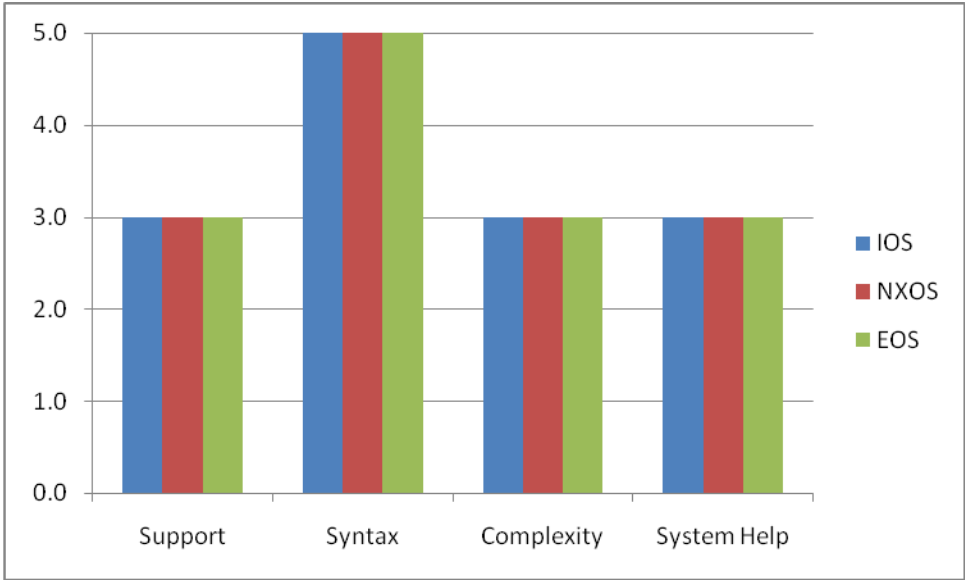
Commentary: Support for this action is identical across all three platforms.

6.5 Set local switch to be STP root primary



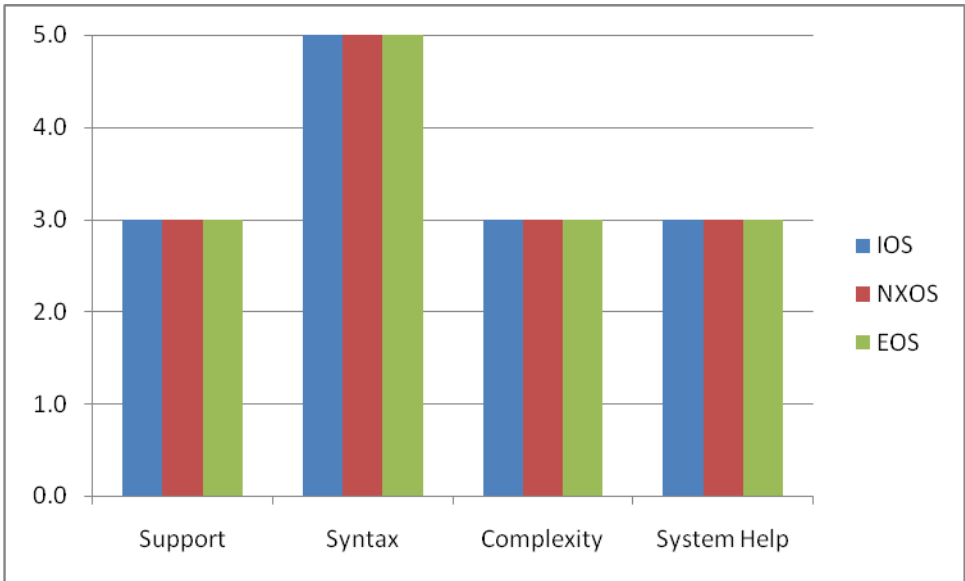
Commentary: Support for this action is identical across all three platforms.

6.6 Show spanning-tree



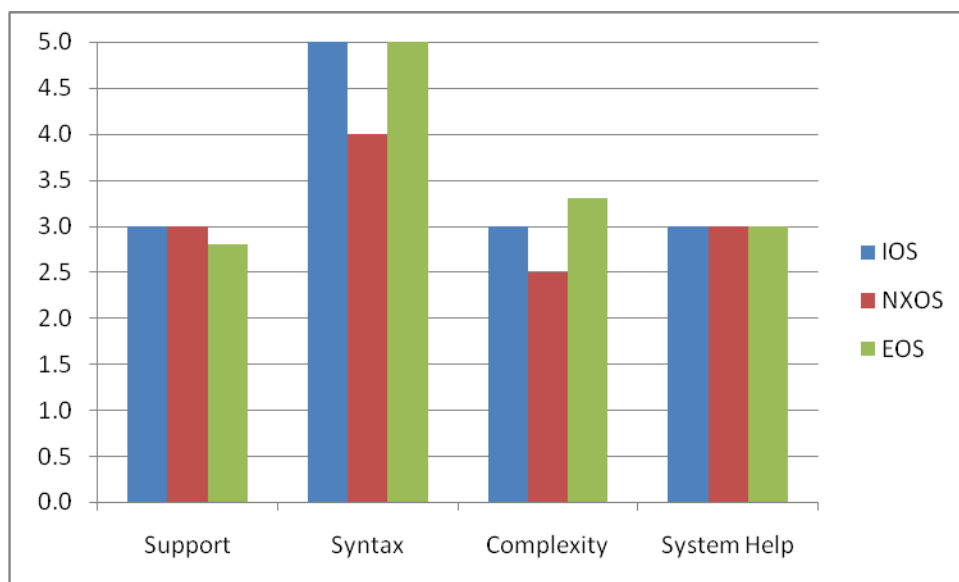
Commentary: Support for this action is identical across all three platforms.

6.7 Configure an MST instance



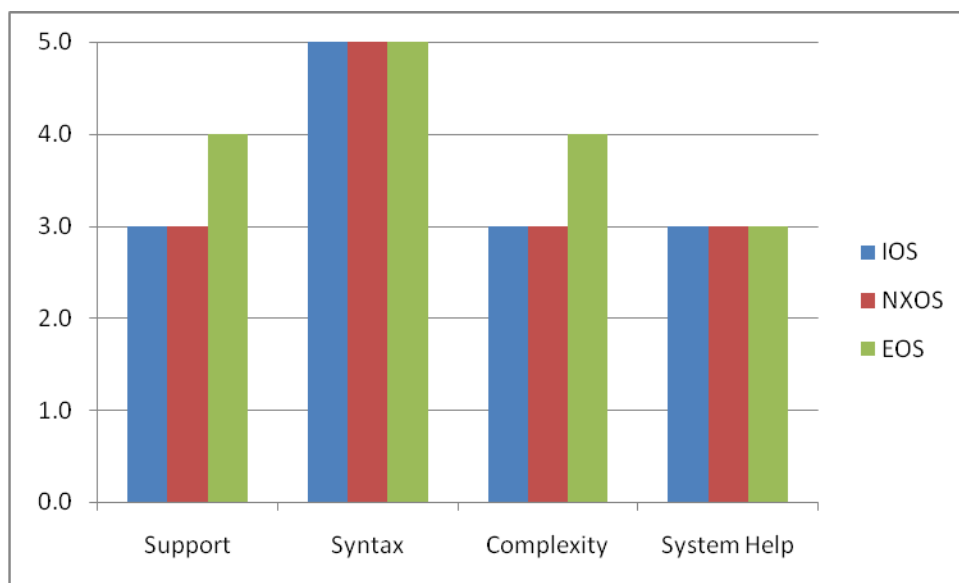
Commentary: Support for this action is identical across all three platforms.

IGMP Snooping and Port Mirroring – Overall Scores



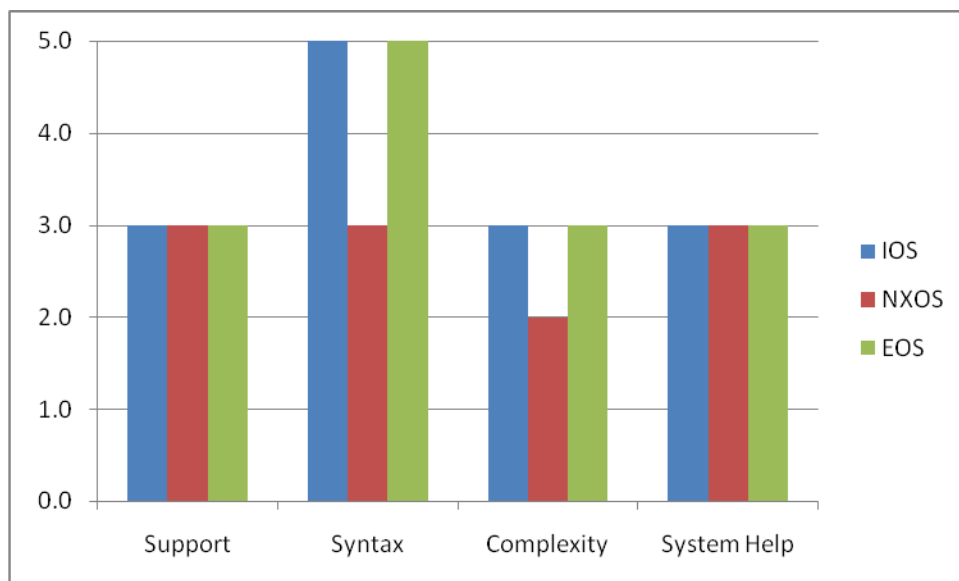
Commentary: IGMP querier configuration on the NXOS is the only significant negative deviation seen in these tests. EOS provides more IGMP counter information than the other platforms.

7.1 show ip igmp snooping



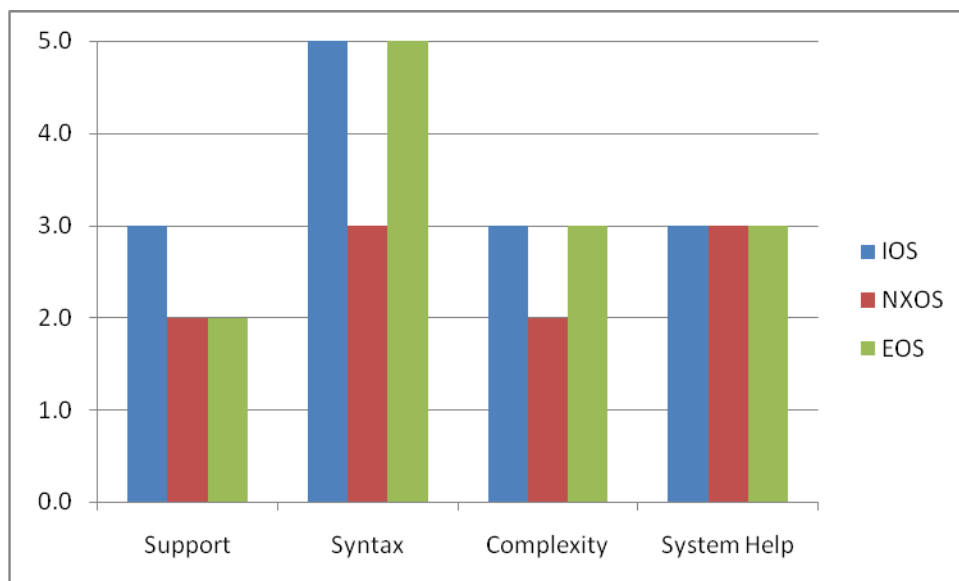
Commentary: Counters functionality on EOS is useful and unavailable on IOS and NXOS.

7.2 Configure an IGMP querier



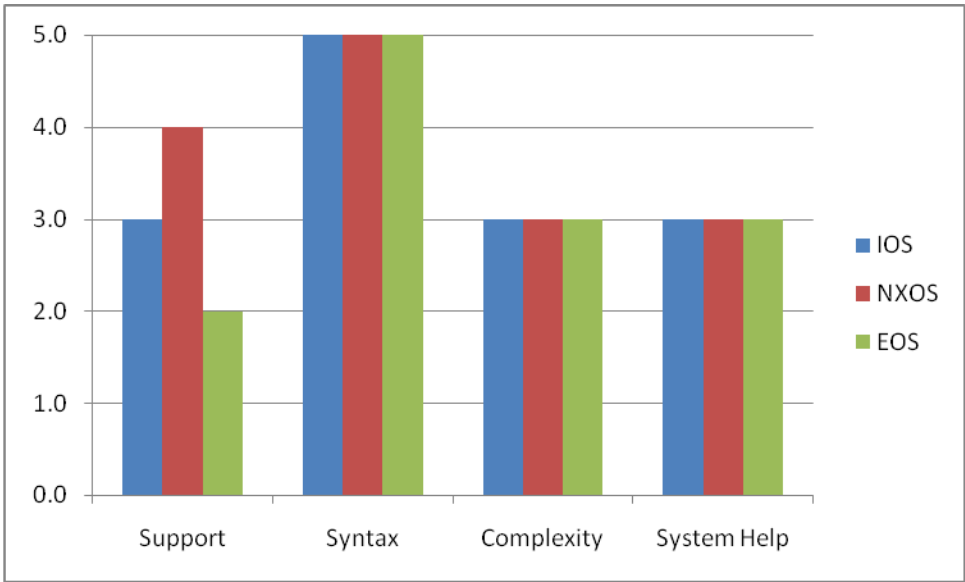
Commentary: NXOS will only allow an IGMP querier to be configured from VLAN configuration.

7.3 Configure a port mirroring session



Commentary: Neither NXOS or EOS allow remote monitoring. NXOS requires a separate monitor session configuration mode, where EOS follows the IOS model and allows for one line configurations.

7.4 Show monitor session



Commentary: EOS output is less verbose than IOS, where NXOS gives additional state information.

Appendix A – Raw test data

1.1.1 User Accounts and Passwords

CISCO.3650.2005(config)#username ?

WORD User name

CISCO.3650.2005(config)#username dheyman ?

access-class Restrict access by access-class
autocommand Automatically issue a command after the user logs in
callback-dialstring Callback dialstring
callback-line Associate a specific line with this callback
callback-rotary Associate a rotary group with this callback
dnis Do not require password when obtained via DNIS
nocallback-verify Do not require authentication after callback
noescape Prevent the user from using an escape character
nohangup Do not disconnect after an automatic command
nopassword No password is required for the user to log in
password Specify the password for the user
privilege Set user privilege level
secret Specify the secret for the user
user-maxlinks Limit the user's number of inbound links
view Set view name
<cr>

CISCO.3650.2005(config)#username dheyman password ?

0 Specifies an UNENCRYPTED password will follow
7 Specifies a HIDDEN password will follow
LINE The UNENCRYPTED (cleartext) user password

CISCO.3650.2005(config)#username dheyman password test

CISCO.3650.2005(config)#username lavanya secret test

CISCO.3650.2005(config)#username dheyman pr

CISCO.3650.2005(config)#username dheyman privilege ?

<0-15> User privilege level

nexus_n5020(config)# username dheyman password ?

0 Password for the user (clear text)
5 strongly encrypted password
WORD Password for the user (clear text)

nexus_n5020(config)# username dheyman password test

Password is not strong enough:it should be atleast 8 characters

nexus_n5020(config)# username dheyman password test1234

Password specified is not strong enough:it is based on a dictionary word

nexus_n5020(config)# username dheyman password t3st1234

7148-2016(config)#username dheyman ?

nopassword No password is required for the user to log in
secret Configure login secret for the account

7148-2016(config)#username dheyman secret ?

0 Specifies an UNENCRYPTED password will follow
5 Specifies an ENCRYPTED password will follow

LINE The UNENCRYPTED (cleartext) user account password

7148-2016(config)#username dheyman secret test

7148-2016(config)#username dheyman secret ?

0 Specifies an UNENCRYPTED password will follow

5 Specifies an ENCRYPTED password will follow

LINE The UNENCRYPTED (cleartext) user account password

7148-2016(config)#username dheyman secret test

7148-2016(config)#username dheyman password test

% Invalid input

7148-2016(config)#username dheyman password test

% Invalid input

1.1.2 Hostname

Cisco.3560.2005#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Cisco.3560.2005(config)#hostname CISCO.3650.2005

CISCO.3650.2005(config)#^Z

CISCO.3650.2005(config)#hostname ?

WORD This system's network name

n5020# conf t

n5020(config)# hostname nexus_n5020

nexus_n5020(config)#

nexus_n5020#

nexus_n5020(config)# hostname ?

WORD Enter switchname

7148s.2016#conf t

7148s.2016(config)#hostname

7148s.2016(config)#hostname 7148-2016

7148-2016(config)#exit

7148-2016(config)#hostname ?

WORD The system's hostname

1.1.3 Banners

CISCO.3650.2005(config)#banner ?

LINE c banner-text c, where 'c' is a delimiting character

config-save Set message for saving configuration

exec Set EXEC process creation banner

incoming Set incoming terminal line banner

login Set login banner

motd Set Message of the Day banner

prompt-timeout Set Message for login authentication timeout

slip-ppp Set Message for SLIP/PPP

```
CISCO.3650.2005(config)#banner motd MOTD
Enter TEXT message. End with the character 'M'.
dheyman eval in progress M
```

```
nexus_n5020(config)# banner ?
motd Configure banner motd message
```

```
nexus_n5020(config)# banner motd ?
LINE delimiter character followed by message
```

```
nexus_n5020(config)# banner motd
% Incomplete command
nexus_n5020(config)# banner motd .
Enter TEXT message. End with the character '.'.
> dheyman eval in progress
> .
nexus_n5020(config)# show banner motd
```

```
dheyman eval in progress
```

```
7148-2016(config)#banner ?
login Set the login banner
motd Set the Message of the Day banner
```

```
7148-2016(config)#banner motd ?
<cr>
```

```
7148-2016(config)#banner motd
Enter TEXT message. Type 'EOF' on its own line to end.
dheyman eval in progress
EOF
7148-2016(config)#show banner motd
% Invalid input
7148-2016(config)#show banner ?
% Unrecognized command
7148-2016(config)#exit
```

1.1.4 Default IP Route

```
CISCO.3650.2005#conf t
Enter configuration commands, one per line. End with CNTL/Z.
CISCO.3650.2005(config)#ip route 0.0.0.0 0.0.0.0 10.10.101.1
%Invalid next hop address (it's this router) << Nice.
CISCO.3650.2005(config)#ip route 0.0.0.0 0.0.0.0 10.0.0.1
CISCO.3650.2005(config)#ip route 0.0.0.0/0 10.255.255.3
^
% Invalid input detected at '^' marker.
```

```
nexus_n5020(config)# ip route 0.0.0.0/0 10.255.255.3
nexus_n5020(config)#
```

```
nexus_n5020(config-if)# ip address 10.10.100.1/24
nexus_n5020(config-if)#
nexus_n5020# show int mgmt 0
mgmt0 is up
```

Hardware is GigabitEthernet, address is 000d.ecb1.7a80 (bia 000d.ecb1.7a80)
 Internet Address is 10.10.100.1/24
 MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
 reliability 255/255, txload 1/255, rxload 1/255
 Encapsulation ARPA
 full-duplex, 1000 Mb/s
 30 minute input rate 13005367 bytes/sec, 135205 packets/sec
 30 minute output rate 2695312 bytes/sec, 24067 packets/sec
 Rx
 135209 input packets 21220 unicast packets 105939 multicast packets
 8050 broadcast packets 13005653 bytes
 Tx
 24067 output packets 21228 unicast packets 2805 multicast packets
 34 broadcast packets 2695312 bytes

```
nexus_n5020# conf t
nexus_n5020(config)# ip route 0.0.0.0/0 10.10.100.1
```

```
7148-2016#conf t
7148-2016(config)#ip route 0.0.0.0/0 10.255.255.3
7148-2016(config)#
```

```
7148-2016#show ip int br
```

Interface	IP Address	Status	Protocol
Management1	10.255.255.116/24	up	up
Management2	unassigned	up	down
Vlan2	10.2.0.2/16	up	lowerLayerDown

```
7148-2016#conf t
7148-2016(config)#ip route 0.0.0.0/0 10.255.255.116
```

1.1.5 Date / time

```
CISCO.3650.2005#clock set 10:00:00 25 June 2009
CISCO.3650.2005#
```

```
nexus_n5020(config)#
nexus_n5020# clock set 10:00:00 25 June 2009
Thu Jun 25 10:00:00 UTC 2009
```

```
7148-2016#clock set 10:00:00 25 June 2009
% Invalid input
7148-2016#clock ?
set Set the system date and time
```

```
7148-2016#clock set ?
hh:mm:ss Current time
```

```
7148-2016#clock set 10:00:00 ?
mm/dd/yyyy Today's date
```

```
7148-2016#clock set 10:00:00 06/25/2009
```

1.1.6 NTP

CISCO.3650.2005#conf t

Enter configuration commands, one per line. End with CNTL/Z.

CISCO.3650.2005(config)#ntp ?

- access-group Control NTP access
- authenticate Authenticate time sources
- authentication-key Authentication key for trusted time sources
- broadcastdelay Estimated round-trip delay
- clock-period Length of hardware clock tick
- logging Enable NTP message logging
- max-associations Set maximum number of associations
- peer Configure NTP peer
- server Configure NTP server
- source Configure interface for source address
- trusted-key Key numbers for trusted time sources

CISCO.3650.2005(config)#ntp server ?

- Hostname or A.B.C.D IP address of peer
- vrf VPN Routing/Forwarding Information

CISCO.3650.2005(config)#ntp server 10.0.0.1 ?

- key Configure peer authentication key
- prefer Prefer this peer when possible
- source Interface for source address
- version Configure NTP version

<cr>

CISCO.3650.2005(config)#ntp server 10.0.0.1

nexus_n5020# conf t

nexus_n5020(config)# ntp ?

- abort Abort the ntp configuration
- commit Commit the ntp configuration
- distribute Enable NTP configuration distribution
- peer NTP Peer address
- server NTP server address

nexus_n5020(config)# ntp server ?

WORD Hostname/IP address of the NTP Server

nexus_n5020(config)# ntp server 10.0.0.1

nexus_n5020(config)# ntp server 10.0.0.1 ?

<CR>

- prefer Preferred Server
- use-vrf vrf to reach this server

7148-2016(config)#ntp server ?

WORD Hostname or A.B.C.D

7148-2016(config)#ntp ?

server Configure NTP server

7148-2016(config)#ntp server 10.0.0.1

1.1.7 Show version

CISCO.3650.2005#show ver
Cisco IOS Software, C3560 Software (C3560-ADVIPSERVICESK9-M), Version 12.2(46)SE
, RELEASE SOFTWARE (fc2)
Copyright (c) 1986-2008 by Cisco Systems, Inc.
Compiled Thu 21-Aug-08 15:26 by nachen
Image text-base: 0x00003000, data-base: 0x01A00000

ROM: Bootstrap program is C3560 boot loader
BOOTLDR: C3560 Boot Loader (C3560-HBOOT-M) Version 12.2(25r)SEB, RELEASE SOFTWARE (fc)

CISCO.3650.2005 uptime is 1 day, 14 hours, 48 minutes
System returned to ROM by power-on
System image file is "flash:c3560-advipservicesk9-mz.122-46.SE.bin"

This product contains cryptographic features and is subject to United States and local country laws governing import, export, transfer and use. Delivery of Cisco cryptographic products does not imply third-party authority to import, export, distribute or use encryption. Importers, exporters, distributors and users are responsible for compliance with U.S. and local country laws. By using this product you agree to comply with applicable laws and regulations. If you are unable to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
<http://www.cisco.com/wwl/export/crypto/tool/stqrg.html>

If you require further assistance please contact us by sending email to export@cisco.com.

cisco WS-C3560-24TS (PowerPC405) processor (revision C0) with 122880K/8184K bytes of memory.
Processor board ID CAT0929R1H3
Last reset from power-on
6 Virtual Ethernet interfaces
24 FastEthernet interfaces
2 Gigabit Ethernet interfaces

The password-recovery mechanism is enabled.

512K bytes of flash-simulated non-volatile configuration memory.
Base ethernet MAC Address : 00:14:A9:17:38:00
Motherboard assembly number : 73-9897-05
Power supply part number : 341-0097-02
Motherboard serial number : CAT092910GH
Power supply serial number : DCA09200BT2
Model revision number : C0
Motherboard revision number : A0
Model number : WS-C3560-24TS-S
System serial number : CAT0929R1H3
Top Assembly Part Number : 800-26160-02

Top Assembly Revision Number : A0
 Version ID : V02
 CLEI Code Number : COMMG00ARB
 Hardware Board Revision Number : 0x01

Switch	Ports	Model	SW Version	SW Image
-----	-----	-----	-----	-----
*	1 26	WS-C3560-24TS	12.2(46)SE	C3560-ADVIPSERVICESK9-M

Configuration register is 0xF

n5020# show ver
 Cisco Nexus Operating System (NX-OS) Software
 TAC support: <http://www.cisco.com/tac>
 Copyright (c) 2002-2009, Cisco Systems, Inc. All rights reserved.
 The copyrights to certain works contained herein are owned by
 other third parties and are used and distributed under license.
 Some parts of this software are covered under the GNU Public
 License. A copy of the license is available at
<http://www.gnu.org/licenses/gpl.html>.

Software

BIOS: version 1.2.0
 loader: version N/A
 kickstart: version 4.0(1a)N2(1a)
 system: version 4.0(1a)N2(1a)
 BIOS compile time: 06/19/08
 kickstart image file is: bootflash:/n5000-uk9-kickstart.4.0.1a.N2.1a.bin
 kickstart compile time: 4/29/2009 13:00:00 [04/29/2009 20:10:52]
 system image file is: bootflash:/n5000-uk9.4.0.1a.N2.1a.bin
 system compile time: 4/29/2009 13:00:00 [04/29/2009 20:41:32]

Hardware

cisco Nexus5020 Chassis ("40x10GE/Supervisor")
 Intel(R) Celeron(R) M CPU with 2074308 kB of memory.
 Processor Board ID JAF1250AHTC

Device name: n5020
 bootflash: 974848 kB

Kernel uptime is 1 day(s), 10 hour(s), 59 minute(s), 7 second(s)

Last reset at 315886 usecs after Thu Jul 2 05:26:12 2009

Reason: Reset Requested by CLI command reload
 System version: 4.0(1a)N2(1a)
 Service:

plugin

Core Plugin, Ethernet Plugin

7148s.2016#show ver
 Arista DCS-7148S

Hardware version: 02.02
 Serial number: JFL08290040

Software image version: 4.1.0
 Architecture: i386
 Internal build version: 4.1.0-141362.EOS4.1.0
 Internal build ID: ab3bc920-633d-4ad8-9b0c-6df6d4707886

Uptime: 16 hours and 52 minutes
 Total memory: 1036052 kB
 Free memory: 103560 kB

1.1.8 Show running-configuration

No data shown – output is too large

1.1.9 Show users

Show users

CISCO.3650.2005#show users all

Line	User	Host(s)	Idle	Location
* 0 con 0		idle	00:00:00	
1 vty 0			00:00:00	
2 vty 1			00:00:00	
3 vty 2			00:00:00	
4 vty 3			00:00:00	
5 vty 4			00:00:00	
6 vty 5			00:00:00	
7 vty 6			00:00:00	
8 vty 7			00:00:00	
9 vty 8			00:00:00	
10 vty 9			00:00:00	
11 vty 10			00:00:00	
12 vty 11			00:00:00	
13 vty 12			00:00:00	
14 vty 13			00:00:00	
15 vty 14			00:00:00	
16 vty 15			00:00:00	

Interface	User	Mode	Idle	Peer Address
-----------	------	------	------	--------------

n5020# show users ?

<CR>

> Redirect it to a file

| Pipe command output to filter

n5020# show users

NAME	LINE	TIME	IDLE	PID	COMMENT
admin	ttyS0	Jul 3 15:54	.	1054*	

7148sx.2001#show users

Line	User	Host(s)	Idle	Location
* 1 con 0	admin	idle	00:00:00	-

2.1 show interface

CISCO.3650.2005#show int g0/2

GigabitEthernet0/2 is up, line protocol is down (monitoring)

Hardware is Gigabit Ethernet, address is 0014.a917.3802 (bia 0014.a917.3802)

MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,

reliability 255/255, txload 1/255, rxload 1/255

Encapsulation ARPA, loopback not set

Keepalive not set

Full-duplex, 1000Mb/s, link type is force-up, media type is unsupported

input flow-control is off, output flow-control is unsupported

ARP type: ARPA, ARP Timeout 04:00:00

Last input never, output 1d18h, output hang never

Last clearing of "show interface" counters never

Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0

Queueing strategy: fifo

Output queue: 0/40 (size/max)

5 minute input rate 0 bits/sec, 0 packets/sec

5 minute output rate 0 bits/sec, 0 packets/sec

0 packets input, 0 bytes, 0 no buffer

Received 0 broadcasts (0 multicasts)

0 runs, 0 giants, 0 throttles

0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored

0 watchdog, 0 multicast, 0 pause input

0 input packets with dribble condition detected

1 packets output, 64 bytes, 0 underruns

0 output errors, 0 collisions, 1 interface resets

0 babbles, 0 late collision, 0 deferred

0 lost carrier, 0 no carrier, 0 PAUSE output

0 output buffer failures, 0 output buffers swapped out

Ethernet1/37 is up

Hardware is 10000 Ethernet, address is 000d.ecb1.7aac (bia 000d.ecb1.7aac)

MTU 1500 bytes, BW 10000000 Kbit, DLY 10 usec,

reliability 255/255, txload 1/255, rxload 1/255

Encapsulation ARPA

Port mode is fex-fabric

full-duplex, 10 Gb/s, media type is 10g

Input flow-control is off, output flow-control is off

Auto-mdix is turned on

Rate mode is dedicated

Switchport monitor is off

Last clearing of "show interface" counters never

5 minute input rate 193 bytes/sec, 0 packets/sec

5 minute output rate 194 bytes/sec, 0 packets/sec

Rx

118561 input packets 0 unicast packets 118561 multicast packets

0 broadcast packets 0 jumbo packets 0 storm suppression packets

75405596 bytes

0 No buffer 0 runt 0 Overrun

0 crc 0 Ignored 0 Bad etype drop

0 Bad proto drop

Tx

118462 output packets 118460 multicast packets

```

2 broadcast packets 0 jumbo packets
75813994 bytes
0 output CRC 0 ecc
0 underrun 0 if down drop    0 output error 0 collision 0 deferred
0 late collision 0 lost carrier 0 no carrier
0 babble
0 Rx pause 0 Tx pause 0 reset

```

```

7148s.2016#show int et1
Ethernet1 is up, line protocol is up
Hardware is Ethernet, address is 001c.7304.195c (bia 001c.7304.195c)
MTU 9212 bytes, BW 1000000 Kbit
Full-duplex, 1Gb/s, auto negotiation: off

```

```

5 minutes input rate 0 bits/sec (0%), 0 packets/sec
5 minutes output rate 256 bits/sec (0%), 0 packets/sec
91514714 packets input, 5856941696 bytes
Received 4 broadcasts, 0 multicast
0 runs, 0 giants
0 input errors, 0 CRC, 0 alignment, 0 symbol
0 PAUSE input
87813794 packets output, 5620082816 bytes
Sent 0 broadcasts, 16060 multicast
0 output errors, 0 collisions
0 late collision, 0 deferred
0 PAUSE output

```

2.2 VLAN configuration

```

CISCO.3650.2005(config)#vlan 505
CISCO.3650.2005(config-vlan)#name test

```

```

n5020# conf t
n5020(config)# vlan 505
n5020(config-vlan)# name test

```

```

7148sx.2001(config)#vlan 505
7148sx.2001(config-vlan-505)#name test

```

2.3 Configure a SVI

```

CISCO.3650.2005(config)#int vlan2
3w2d: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan2, changed state to down
CISCO.3650.2005(config-if)#desc vlan 2
CISCO.3650.2005(config-if)#ip address 10.10.100.200 255.255.255.0

```

```

nexus_n5020(config)# int vlan 2
^

```

% invalid command detected at '^' marker.

```

nexus_n5020(config)# vlan 2
nexus_n5020(config-vlan)# exit
nexus_n5020(config)# int vlan 2
^

```

% invalid command detected at '^' marker.

```
nexus_n5020(config)# int ?
ethernet      Ethernet IEEE 802.3z
fc            Fibre Channel interface
mgmt          Management interface
port-channel   Port Channel interface
san-port-channel SAN Port Channel interface
vfc           Virtual FC interface
```

```
7148-2016(config)#int vlan2
7148-2016(config-if-Vl2)#ip address 10.10.200.201/24
7148-2016(config-if-Vl2)#desc test
```

2.4 Add a port to a new VLAN

```
CISCO.3650.2005(config)#int g0/1
CISCO.3650.2005(config-if)#switchport access vlan 10
% Access VLAN does not exist. Creating vlan 10
```

```
n5020(config)# int eth1/7
n5020(config-if)# show run int eth1/7
version 4.0(1a)N2(1a)
```

```
interface Ethernet1/7
```

```
n5020(config-if)# switchport access vlan 10
n5020(config-if)#
```

```
n5020# show vlan id 10
VLAN 10 not found in current VLAN database
```

```
n5020# conf t
n5020(config)# vlan 10
n5020(config-vlan)#
n5020# show vlan id 10
```

VLAN Name	Status	Ports
10 VLAN0010	active	Eth1/7

```
7148s.2016#conf t
7148s.2016(config)#int eth1
7148s.2016(config-if-Et1)#switchport access vlan 10
% Access VLAN does not exist. Creating vlan 10
7148s.2016(config-if-Et1)#
```

2.5 Show vlan

```
CISCO.3650.2005#show vlan id 10
```

VLAN Name	Status	Ports
10 VLAN0010	active	Gi0/1

```
VLAN Type SAID      MTU  Parent RingNo BridgeNo Stp  BrgdMode Trans1 Trans2
```

```
-----
10 enet 100010 1500 - - - - - 0 0
```

Remote SPAN VLAN

Disabled

Primary	Secondary	Type	Ports

n5020# show vlan id 10

VLAN Name	Status	Ports

10	VLAN0010	active	Eth1/7
----	----------	--------	--------

Remote SPAN VLAN

Disabled

Primary	Secondary	Type	Ports

7148sx.2001(config-vlan-10)#

7148sx.2001#show vlan 10

VLAN Name	Status	Ports

10	VLAN0010	active
----	----------	--------

7148sx.2001#show vlan ?

WORD VLAN ID or range(s) of VLAN IDs
 active-configuration Show only active configuration
 configured-ports Show all configured ports
 id Show the status of a specific VLAN ID
 name Show the status of a specific named VLAN
 summary VLAN summary information
 | Output modifiers
 <cr>

7148sx.2001#show vlan id 10

VLAN Name	Status	Ports

10	VLAN0010	active
----	----------	--------

2.6 Create a trunk

CISCO.3650.2005(config-if)#switchport trunk allowed vlan 505

CISCO.3650.2005(config-if)#swi tr all vlan ?

WORD VLAN IDs of the allowed VLANs when this port is in trunking mode

add add VLANs to the current list

all all VLANs

except all VLANs except the following

none no VLANs

remove remove VLANs from the current list

n5020(config-if)# switchport trunk allowed vlan 505

<1-3967,4048-4093> VLAN IDs of the allowed VLANs when this port in trunking mode
 add add VLANs to the current list
 all all VLANs
 except all VLANs except the following
 none no VLANs
 remove remove VLANs from the current list

7148sx.2001(config-if-Et3)#switchport trunk allowed vlan 505

7148sx.2001(config-if-Et3)#switchport trunk allowed vlan ?
 WORD VLAN IDs of the allowed VLANs when this port is in trunking mode
 add add VLANs to the current list
 all all VLANs
 except all VLANs except the following
 none no VLANs
 remove remove VLANs from the current list

2.7 Show mac table

CISCO.3650.2005#sho mac
 % Incomplete command.

CISCO.3650.2005#show mac address-table
 Mac Address Table

```
-----
Vlan  Mac Address      Type      Ports
----  -
All   0100.0ccc.cccc     STATIC    CPU
All   0100.0ccc.cccd     STATIC    CPU
All   0180.c200.0000     STATIC    CPU
All   0180.c200.0001     STATIC    CPU
All   0180.c200.0002     STATIC    CPU
All   0180.c200.0003     STATIC    CPU
All   0180.c200.0004     STATIC    CPU
All   0180.c200.0005     STATIC    CPU
All   0180.c200.0006     STATIC    CPU
All   0180.c200.0007     STATIC    CPU
All   0180.c200.0008     STATIC    CPU
All   0180.c200.0009     STATIC    CPU
All   0180.c200.000a     STATIC    CPU
All   0180.c200.000b     STATIC    CPU
All   0180.c200.000c     STATIC    CPU
All   0180.c200.000d     STATIC    CPU
All   0180.c200.000e     STATIC    CPU
All   0180.c200.000f     STATIC    CPU
All   0180.c200.0010     STATIC    CPU
All   ffff.ffff.ffff     STATIC    CPU
```

Total Mac Addresses for this criterion: 20

n5020# show mac address-table

^

% invalid command detected at '^' marker.

n5020# show mac ?

<CR>

> Redirect it to a file

access-lists List access lists

address address

aging-time Display Aging Time (configured or default)

count Display only the count of MAC entries

dynamic Display Dynamic Entries

interface Interface

multicast Show Multicast MAC Table entries

notification Display Notification Information

static Display Static Entries

vlan VLAN

| Pipe command output to filter

n5020# show mac address ?

EEEE.EEEE.EEEE MAC Address

n5020# show mac address

% Incomplete command

n5020# show mac dyn ?

<CR>

> Redirect it to a file

address address

interface Interface

vlan VLAN

| Pipe command output to filter

n5020# show mac dyn

VLAN	MAC Address	Type	Age	Port
1	000d.ecb1.7a8e	dynamic	50	Eth1/8
1	001c.7304.159a	dynamic	10	Eth1/8
10	000d.ecb1.7a8f	dynamic	50	Eth1/7
10	001c.7304.1599	dynamic	10	Eth1/7

Total MAC Addresses: 4

n5020# show mac

VLAN	MAC Address	Type	Age	Port
1	000d.ecb1.7a8e	dynamic	0	Eth1/8
1	001c.7304.159a	dynamic	0	Eth1/8
10	000d.ecb1.7a8f	dynamic	0	Eth1/7
10	001c.7304.1599	dynamic	0	Eth1/7

Total MAC Addresses: 4

7148sx.2001#show mac-address-table ?

address address keyword

aging-time aging-time keyword

count count keyword

dynamic dynamic entry type

interface interface keyword

multicast multicast info for selected wildcard


```

static      static entry type
vlan        VLAN Keyword
|           Output modifiers
<cr>

```

```

7148sx.2001#show mac-address-table
      Mac Address Table
-----

```

```

Vlan  Mac Address      Type      Ports  Moves  Last Move
---  -
Total Mac Addresses for this criterion: 0

```

2.8 Configure flow control

```

CISCO.3650.2005(config-if)#flowcontrol ?
receive  Configure receiving flow operation

```

```

CISCO.3650.2005(config-if)#flowcontrol receive ?
desired  Allow but do not require flow-control packets on port
off      Disable flow-control packets on port
on       Enable flow-control packets on port

```

```

CISCO.3650.2005(config-if)#flowcontrol receive on
CISCO.3650.2005(config-if)#

```

```

n5020(config-if)# flowcontrol ?
receive  Receive pause frames
send     Send pause frames

```

```

n5020(config-if)# flowcontrol receive ?
off      Receive OFF
on       Receive ON

```

```

n5020(config-if)# flowcontrol receive

```

```

7148sx.2001(config)#int et7
7148sx.2001(config-if-Et7)#flowcontrol ?
receive  Configure receiving flow operation
send     Configure transmit flow operation

```

```

7148sx.2001(config-if-Et7)#flowcontrol receive ?
desired  Allow but do not require flow-control capable link partner
off      Forbid flow-control capable link partner
on       Require flow-control capable link partner

```

2.9 Show flow control

```

CISCO.3650.2005#show flow
Port      Send FlowControl  Receive FlowControl  RxPause TxPause
admin    oper    admin    oper

```

```

-----
Fa0/1   Unsupp. Unsupp. off   off   0   0
Fa0/2   Unsupp. Unsupp. off   off   0   0
Fa0/3   Unsupp. Unsupp. off   off   0   0
Fa0/4   Unsupp. Unsupp. off   off   0   0

```

n5020# show int flow

```

-----
Port      Send FlowControl Receive FlowControl RxPause TxPause
         admin   oper   admin   oper
-----
Eth1/1    off    off    off    off     0     0
Eth1/2    off    off    off    off     0     0
Eth1/3    off    off    off    off     0     0
Eth1/4    off    off    off    off     0     0
Eth1/5    off    off    off    off     0     0

```

7148sx.2001#show flow

```

Port      Send FlowControl Receive FlowControl RxPause TxPause
         admin   oper   admin   oper
-----
Et1       off    off    off    off     0     0
Et2       off    off    off    off     0     0
Et3       off    off    off    off     0     0
Et4       off    off    off    off     0     0
Et5       off    off    off    off     0     0
Et6       off    off    off    off     0     0
Et7       off    off    off    off     0     0
Et8       off    off    off    off     0     0
Et9       off    off    off    off     0     0

```

3.1 Configure a logging host

CISCO.3650.2005(config)#logging host 4.2.2.1

nexus_n5020(config)# logging host

^

% invalid command detected at '^' marker.

% Invalid command

nexus_n5020(config)# logging server 4.2.2.1

7148-2016(config)#logging host 4.2.2.1

3.2 Change log buffer size

CISCO.3650.2005(config)#logging buffer 5000

nexus_n5020(config)# logging ?

```

abort      Flushes cached data without committing and releases the lock
commit     Commits cached data (of all msg types) and releases the lock
console    Set console logging

```

distribute Enables/disables fabric distribution using cfs.
 event Interface events
 fex Set fex logging
 level Facility parameter for syslog messages
 logfile Set File logging
 module Set module logging
 monitor Set terminal line(monitor) logging level
 server Enable forwarding to Remote Syslog Server
 timestamp Set logging timestamp granularity

nexus_n5020(config)# logging level ?

nexus_n5020(config)# logging console ?

<CR>

<0-7> 0-emerg;1-alert;2-crit;3-err;4-warn;5-notif;6-inform;7-debug

nexus_n5020(config)# logging console 6

Baud rate of console should be at least 38400 to increase logging level

7148-2016(config)#logging buffered 5000

3.3 Create a SNMP community

CISCO.3650.2005(config)#snmp-server community public ro

CISCO.3650.2005(config)#snmp-server community internal ro

nexus_n5020(config)# snmp-server community public ro

nexus_n5020(config)# snmp-server community private ro

7148-2016(config)#snmp-server community public ro

7148-2016(config)#snmp-server community private ro

3.4 Add a SNMP server

CISCO.3650.2005(config)#snmp-server host 4.2.2.1 traps public

CISCO.3650.2005(config)#snmp-server host 4.2.2.2 traps internal

nexus_n5020(config)# snmp-server host 4.2.2.1 public

nexus_n5020(config)# snmp-server host 4.2.2.2 private

7148-2016(config)#snmp-server host 4.2.2.1 public

7148-2016(config)#snmp-server host 4.2.2.2 private

3.5 Configure a TACACS+ server

CISCO.3650.2005(config)#tacacs-server host 4.2.2.1

CISCO.3650.2005(config)#tacacs-server key TESTKEY

CISCO.3650.2005(config)#tacacs-server timeout ?

<1-1000> Wait time (default 5 seconds)

CISCO.3650.2005(config)#tacacs-server timeout 20

nexus_n5020(config)# tacacs-server host 4.2.2.1

^

% invalid command detected at '^' marker.

```

nexus_n5020(config)# tacacs+ ?
  enable  Enable tacacs+
nexus_n5020(config)# tacacs+ enable

nexus_n5020(config)# tacacs-server host 4.2.2.1
warning: no key is configured for the host

nexus_n5020(config)# tacacs-server key TESTKEY
nexus_n5020(config)# tacacs-server host 4.2.2.1
nexus_n5020(config)# tacacs-server timeout ?
  <1-60>  Global TACACS+ server timeout period in seconds
nexus_n5020(config)# tacacs-server timeout 20

7148-2016(config)#tacacs-server host 4.2.2.1
7148-2016(config)#tacacs-server key TESTKEY
7148-2016(config)#tacacs-server timeout ?
  <1-1000> Wait time (default 5 seconds)

7148-2016(config)#tacacs-server timeout 20

```

3.6 Show tacacs

Show tacacs

CISCO.3650.2005#show tacacs

```

Tacacs+ Server      : 4.2.2.1/49
  Socket opens:      0
  Socket closes:     0
  Socket aborts:     0
  Socket errors:     0
  Socket Timeouts:   0
Failed Connect Attempts: 0
  Total Packets Sent: 0
  Total Packets Recv: 0

```

n5020# show tacacs

timeout value:5

deadtime value:0

total number of servers:0

7148sx.2001#show tacacs

```

TACACS+ server      : 4.2.2.1/49
  Connection opens:  0
  Connection closes: 0
Connection disconnects: 0
  Connection failures: 0
  Connection timeouts: 0
  Messages sent:     0
  Messages received: 0
  Receive errors:    0
  Receive timeouts:  0
  Send timeouts:     0

```

Last time counters were cleared: never

4.2 Show ip route

CISCO.3650.2005#show ip route

Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2

i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2

ia - IS-IS inter area, * - candidate default, U - per-user static route

o - ODR, P - periodic downloaded static route

Gateway of last resort is not set

10.0.0.0/32 is subnetted, 1 subnets

C 10.10.101.1 is directly connected, Loopback0

n5020# show ip route

IP Route Table for VRF "default"

'*' denotes best ucast next-hop '*' denotes best mcast next-hop

'[x/y]' denotes [preference/metric]

0.0.0.0/32, 1 ucast next-hops, 0 mcast next-hops, pending

*via Null0, [220/0], 5d12h, local, discard

255.255.255.255/32, 1 ucast next-hops, 0 mcast next-hops, pending

*via sup-eth0, [0/0], 5d12h, local

7148sx.2001#show ip route

Codes: C - connected, S - static, K - kernel

Gateway of last resort:

S 0.0.0.0/0 [1/60] via 10.255.255.1

C 10.255.255.0/24 is directly connected, Management1

C 192.168.100.0/24 is directly connected, Vlan1

4.3 Ping

CISCO.3650.2005#ping 10.10.101.1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.10.101.1, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms

CISCO.3650.2005#ping 10.10.100.1 ?

data specify data pattern

df-bit enable do not fragment bit in IP header

repeat specify repeat count

size specify datagram size

source specify source address or name

timeout specify timeout interval

validate validate reply data

<cr>

```

n5020# ping 4.2.2.1
PING 4.2.2.1 (4.2.2.1): 56 data bytes
ping: sendto 4.2.2.1 64 chars, No route to host
Request 0 timed out
ping: sendto 4.2.2.1 64 chars, No route to host
Request 1 timed out
ping: sendto 4.2.2.1 64 chars, No route to host
Request 2 timed out
ping: sendto 4.2.2.1 64 chars, No route to host
Request 3 timed out
ping: sendto 4.2.2.1 64 chars, No route to host
Request 4 timed out

--- 4.2.2.1 ping statistics ---
5 packets transmitted, 0 packets received, 100.00% packet loss
n5020# ping ?

```

```

<CR>
A.B.C.D or Hostname IP address of remote system
WORD                Enter Hostname

```

```

n5020# ping 4.2.2.1 ?
<CR>
count      Number of pings to send
df-bit     Enable do not fragment bit in IP header
interval   Wait interval seconds between sending each packet
packet-size Packet size to send
source     Source IP address to use
timeout    Specify timeout interval
vrf        Display per-VRF information

```

```

7148sx.2001#ping 10.255.255.3
PING 10.255.255.3 (10.255.255.3) 72(100) bytes of data.
80 bytes from 10.255.255.3: icmp_seq=1 ttl=255 time=1.34 ms
80 bytes from 10.255.255.3: icmp_seq=2 ttl=255 time=0.227 ms
80 bytes from 10.255.255.3: icmp_seq=3 ttl=255 time=0.172 ms
80 bytes from 10.255.255.3: icmp_seq=4 ttl=255 time=0.127 ms
80 bytes from 10.255.255.3: icmp_seq=5 ttl=255 time=0.230 ms

```

```

--- 10.255.255.3 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 8005ms
rtt min/avg/max/mdev = 0.127/0.419/1.340/0.462 ms

```

```

7148sx.2001#ping 10.255.255.3 ?
df-bit  enable do not fragment bit in IP header
repeat  specify repeat count
size    specify datagram size
timeout specify timeout interval
<cr>

```

5.1 Static LAG

CISCO.3650.2005(config-if)#channel-group 1 ?
mode Etherchannel Mode of the interface

CISCO.3650.2005(config-if)#channel-group 1 mode ?
active Enable LACP unconditionally
auto Enable PAgP only if a PAgP device is detected
desirable Enable PAgP unconditionally
on Enable Etherchannel only
passive Enable LACP only if a LACP device is detected

PAGP (Port Aggregation Protocol) .. Cisco prop LACP

CISCO.3650.2005(config-if)#channel-group 1 mode on
Creating a port-channel interface Port-channel 1

CISCO.3650.2005(config-if)#
3w5d: %LINK-3-UPDOWN: Interface Port-channel1, changed state to up
3w5d: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel1, changed state to up

nexus_n5020# conf t
nexus_n5020(config)# int et1/2
nexus_n5020(config-if)# channel-group 1 mode ?
active Set channeling mode to ACTIVE
on Set channeling mode to ON
passive Set channeling mode to PASSIVE

nexus_n5020(config-if)# channel-group 1 mode on

7148-2016#conf t
7148-2016(config)#int et1
7148-2016(config-if-Et1)#channel-group 1 mode on
7148-2016(config-if-Et1)#channel-group 1?
<1-1000>

7148-2016(config-if-Et1)#channel-group 1 mode ?
active Enable LACP in active mode
on Enable static link aggregation
passive Enable LACP in passive mode

5.2 Show int port-channel

CISCO.3650.2005#show int po1
Port-channel1 is up, line protocol is up (connected)
Hardware is EtherChannel, address is 0014.a917.3801 (bia 0014.a917.3801)
MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
Full-duplex, 1000Mb/s, link type is auto, media type is unknown
input flow-control is off, output flow-control is unsupported
Members in this channel: Gi0/1
ARP type: ARPA, ARP Timeout 04:00:00
Last input 00:00:18, output 00:00:01, output hang never
Last clearing of "show interface" counters never

Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
 Queueing strategy: fifo
 Output queue: 0/40 (size/max)
 5 minute input rate 368000 bits/sec, 187 packets/sec
 5 minute output rate 0 bits/sec, 0 packets/sec
 63420 packets input, 15474803 bytes, 0 no buffer
 Received 63420 broadcasts (63420 multicasts)
 0 runs, 0 giants, 0 throttles
 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
 0 watchdog, 63420 multicast, 0 pause input
 0 input packets with dribble condition detected
 16 packets output, 1623 bytes, 0 underruns
 0 output errors, 0 collisions, 1 interface resets
 0 babbles, 0 late collision, 0 deferred
 0 lost carrier, 0 no carrier, 0 PAUSE output
 0 output buffer failures, 0 output buffers swapped out

n5020# show int po1

port-channel1 is up

Hardware is Port-Channel, address is 000d.ecb1.7aad (bia 000d.ecb1.7aad)

MTU 1500 bytes, BW 20000000 Kbit, DLY 10 usec,

reliability 255/255, txload 1/255, rxload 1/255

Encapsulation ARPA

Port mode is fex-fabric

full-duplex, 10 Gb/s

Input flow-control is off, output flow-control is off

Switchport monitor is off

Members in this channel: Eth1/37, Eth1/38

Last clearing of "show interface" counters never

5 minute input rate 401 bytes/sec, 0 packets/sec

5 minute output rate 406 bytes/sec, 0 packets/sec

Rx

238943 input packets 2 unicast packets 238941 multicast packets

0 broadcast packets 0 jumbo packets 0 storm suppression packets

151969808 bytes

0 No buffer 0 runt 0 Overrun

0 crc 0 Ignored 0 Bad etype drop

0 Bad proto drop

Tx

238739 output packets 238734 multicast packets

2 broadcast packets 0 jumbo packets

305579696 bytes

0 output CRC 0 ecc

0 underrun 0 if down drop 0 output error 0 collision 0 deferred

0 late collision 0 lost carrier 0 no carrier

0 babble

0 Rx pause 0 Tx pause 0 reset

7148sx.2001#show int po1

Port-Channel1 is up, line protocol is up

Hardware is Port-Channel, address is 001c.7302.2f9f

MTU 9212 bytes, BW 20000000 Kbit

Full-duplex, 20Gb/s

Active members in this channel: 2

... Ethernet7 , Full-duplex, 10Gb/s

... Ethernet8 , Full-duplex, 10Gb/s

5 minutes input rate 5 bits/sec (0.0%), 0 packets/sec
 5 minutes output rate 7902655 bits/sec (0.0%), 4617 packets/sec
 2 packets input, 190 bytes
 Received 0 broadcasts, 2 multicast
 0 input errors
 1758150 packets output, 376196228 bytes
 Sent 293128 broadcasts, 1465022 multicast
 0 output errors

5.3 Dynamic LAG using LACP

CISCO.3650.2005(config)#int g0/1
 CISCO.3650.2005(config-if)#channel-group 1 mode active
 Creating a port-channel interface Port-channel 1

7148-2016(config-if-Et1)#channel-group 1 mode pass
 7148-2016(config-if-Et1)#channel-group 1 mode passive
 7148-2016(config-if-Et1)#
 CISCO.3650.2005#show int po1
 Port-channel1 is up, line protocol is up (connected)
 Hardware is EtherChannel, address is 0014.a917.3801 (bia 0014.a917.3801)
 MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
 reliability 255/255, txload 1/255, rxload 0/255
 Encapsulation ARPA, loopback not set
 Keepalive set (10 sec)
 Full-duplex, 1000Mb/s, link type is auto, media type is unknown
 input flow-control is off, output flow-control is unsupported
 Members in this channel: Gi0/1
 ARP type: ARPA, ARP Timeout 04:00:00
 Last input 00:00:00, output 00:00:42, output hang never
 Last clearing of "show interface" counters never
 Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
 Queueing strategy: fifo
 Output queue: 0/40 (size/max)
 5 minute input rate 0 bits/sec, 0 packets/sec
 5 minute output rate 0 bits/sec, 0 packets/sec
 2261 packets input, 200525 bytes, 0 no buffer
 Received 4790 broadcasts (2122 multicasts)
 0 runs, 0 giants, 0 throttles
 0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
 0 watchdog, 2122 multicast, 0 pause input
 0 input packets with dribble condition detected
 699 packets output, 84881 bytes, 0 underruns
 0 output errors, 0 collisions, 7 interface resets
 0 babbles, 0 late collision, 0 deferred
 0 lost carrier, 0 no carrier, 0 PAUSE output
 0 output buffer failures, 0 output buffers swapped out

7148-2016#show int po1
 Port-Channel1 is up, line protocol is up
 Hardware is Port-Channel, address is 001c.7304.195c
 MTU 9212 bytes, BW 1000000 Kbit
 Full-duplex, 1Gb/s
 Active members in this channel: 1
 ... Ethernet1 , Full-duplex, 1Gb/s

5 minutes input rate 188 bits/sec (0%), 0 packets/sec
 5 minutes output rate 227 bits/sec (0%), 0 packets/sec
 293 packets input, 49790 bytes
 Received 45 broadcasts, 248 multicast
 0 input errors
 1366 packets output, 87488 bytes
 Sent 0 broadcasts, 1366 multicast
 0 output errors

CISCO.3650.2005(config-if)#lacp ?
 port-priority LACP priority on this interface

CISCO.3650.2005(config-if)#lacp port-pri
 CISCO.3650.2005(config-if)#lacp port-pri
 CISCO.3650.2005(config-if)#lacp port-priority ?
 <0-65535> Priority value

CISCO.3650.2005(config-if)#lacp port-priority 10
 CISCO.3650.2005(config-if)#

7148-2016(config)#int et1
 7148-2016(config-if-Et1)#lacp port-
 7148-2016(config-if-Et1)#lacp port-priority ?
 <0-65535> LACP Port Priority

7148-2016(config-if-Et1)#lacp port-priority 10

7148-2016(config-if-Et1)#lacp ?
 port-priority Set the port priority associated with this interface
 rate Set the rate at which the peer sends us LACP PDUs

**

nexus_n5020(config-if)# channel-group 2 mode active
 LACP process needs to be started before configuring active mode

nexus_n5020(config)# feature lacp
 nexus_n5020(config)# int et1/2
 nexus_n5020(config-if)# channel-group 1 mode active
 nexus_n5020(config-if)# lacp ?
 port-priority Set LACP port priority

nexus_n5020(config-if)# lacp port-priority 10

6.1 stp interface port cost

CISCO.3650.2005(config-if)#spanning-tree cost 1000
 n5020(config-if)# spanning-tree cost 1000
 7148s.2016(config-if-Et1)#spanning-tree cost 1000

6.2 stp interface portfast

CISCO.3650.2005(config-if)#spanning-tree portfast
 %Warning: portfast should only be enabled on ports connected to a single

host. Connecting hubs, concentrators, switches, bridges, etc... to this interface when portfast is enabled, can cause temporary bridging loops.
Use with CAUTION

%Portfast has been configured on GigabitEthernet0/1 but will only have effect when the interface is in a non-trunking mode.

```
n5020(config-if)# spanning-tree portfast
n5020(config-if)#
```

```
7148s.2016(config-if-Et1)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
host. Connecting hubs, concentrators, switches, bridges, etc. to this
interface when portfast is enabled can cause temporary bridging loops.
Use with CAUTION.
```

6.3 stp interface link-type

```
CISCO.3650.2005(config-if)#spanning-tree link-type ?
point-to-point Consider the interface as point-to-point
shared          Consider the interface as shared
```

```
n5020(config-if)# spanning-tree link-type ?
auto            Detemine link type based on media duplex of this interface
point-to-point Consider the interface as point-to-point
shared          Consider the interface as shared
```

```
7148s.2016(config-if-Et1)#spanning-tree link-type ?
point-to-point Consider the interface as point-to-point
shared          Consider the interface as shared
```

6.4 stp interface bpduguard

```
CISCO.3650.2005(config-if)#spanning-tree bpduguard ?
disable Disable BPDU guard for this interface
enable   Enable BPDU guard for this interface
```

```
n5020(config-if)# spanning-tree bpduguard ?
disable Disable BPDU Guard for this interface
enable   Enable BPDU Guard for this interface
```

```
7148s.2016(config-if-Et1)#spanning-tree bpduguard ?
disable Disable bpduguard
enable   Enable bpduguard
```

6.5 stp local switch root primary

```
CISCO.3650.2005(config)#spanning-tree vlan 1 root primary
n5020(config)# spanning-tree vlan 1 root primary ?
7148sx.2001(config)#spanning-tree root primary ?
<cr>
```

6.6 show spanning-tree

CISCO.3650.2005#show span

VLAN0010

Spanning tree enabled protocol ieee

Root ID Priority 32769

Address 000d.ecb1.7abc

Cost 4

Port 1 (GigabitEthernet0/1)

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 32778 (priority 32768 sys-id-ext 10)

Address 0014.a917.3800

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Aging Time 300

Interface	Role	Sts	Cost	Prio.	Nbr	Type
Gi0/1	Root	FWD	4	128.1	P2p	

n5020# show spanning-tree

VLAN0001

Spanning tree enabled protocol rstp

Root ID Priority 32768

Address 001c.7302.2f98

Cost 2

Port 136 (Ethernet1/8)

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 32769 (priority 32768 sys-id-ext 1)

Address 000d.ecb1.7abc

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Interface	Role	Sts	Cost	Prio.	Nbr	Type
Eth1/8	Root	FWD	2	128.136	P2p	

VLAN0010

Spanning tree enabled protocol rstp

Root ID Priority 32768

Address 001c.7302.2f98

Cost 2

Port 135 (Ethernet1/7)

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 32778 (priority 32768 sys-id-ext 10)

Address 000d.ecb1.7abc

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Interface	Role	Sts	Cost	Prio.	Nbr	Type
Eth1/7	Root	FWD	2	128.135	P2p	

7148sx.2001#show span

MST0

Spanning tree enabled protocol rstp

Root ID Priority 32768

Address 001c.7302.2f98

This bridge is the root

Bridge ID Priority 32768 (priority 32768 sys-id-ext 0)

Address 001c.7302.2f98

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Interface	Role	State	Cost	Prio.Nbr	Type
Et1	designated	discarding	2000	128.1	P2p
Et7	designated	forwarding	2000	128.7	P2p
Et8	designated	forwarding	2000	128.8	P2p
Et45	designated	discarding	20000	128.45	P2p
Et47	designated	discarding	20000	128.47	P2p

6.7 Configure a MST instance

CISCO.3650.2005(config)#spanning-tree mst configuration

CISCO.3650.2005(config-mst)#instance 1 vlan 20

n5020(config)# spanning-tree mst configuration

n5020(config-mst)# instance 1 vlan 20

7148sx.2001(config)#spanning-tree mst configuration

7148sx.2001(config-mst)#instance 1 vlan 20

7.1 show ip igmp snooping

CISCO.3650.2005#show ip igmp snooping

Global IGMP Snooping configuration:

```

-----
IGMP snooping           : Enabled
IGMPv3 snooping (minimal) : Enabled
Report suppression      : Enabled
TCN solicit query       : Disabled
TCN flood query count    : 2
Robustness variable     : 2
Last member query count  : 2
Last member query interval : 1000
  
```

Vlan 1:

```

-----
IGMP snooping           : Enabled
IGMPv2 immediate leave   : Disabled
Multicast router learning mode : pim-dvmrp
CGMP interoperability mode : IGMP_ONLY
Robustness variable     : 2
Last member query count  : 2
  
```

Last member query interval : 1000

n5020# show ip igmp snooping
Global IGMP Snooping Information:
IGMP Snooping enabled

IGMP Snooping information for vlan 1
IGMP snooping enabled
IGMP querier none
Switch-querier disabled
Explicit tracking enabled
Fast leave disabled
Report suppression enabled
Router port detection using PIM Hellos, IGMP Queries
Number of router-ports: 0
Number of groups: 0

7148sx.2001#show ip igmp snooping
Global IGMP Snooping configuration:

IGMP snooping : Enabled
Robustness variable : 2

Vlan 1 :

IGMP snooping : Enabled
Multicast router learning mode : pim-dvmrp

Vlan 10 :

IGMP snooping : Enabled
Multicast router learning mode : pim-dvmrp

7148sx.2001#show ip igmp snooping counters

	Input				Output				
Interface	Queries	Reports	Leaves	Other	Errors	Queries	Reports	Leaves	Other
Ethernet1	0	0	0	0	0	0	0	0	0
Ethernet2	0	0	0	0	0	0	0	0	0
Ethernet3	0	0	0	0	0	0	0	0	0

7.2 configure an igmp querier

CISCO.3650.2005(config)#ip igmp snooping querier address ?
A.B.C.D IGMP querier source IP address

n5020(config)# ip igmp snooping ?
<CR>

n5020(config)# vlan 599

n5020(config-vlan)# ip igmp snooping querier ?
A.B.C.D Querier IP address

7148sx.2001(config)#ip igmp snooping querier address ?
A.B.C.D IP address

7.3 configure a port mirroring session

```
CISCO.3650.2005(config)#monitor session 1 source ?
interface SPAN source interface
remote SPAN source Remote
vlan SPAN source VLAN
```

```
CISCO.3650.2005(config)#monitor session 1 source interface ?
FastEthernet FastEthernet IEEE 802.3
GigabitEthernet GigabitEthernet IEEE 802.3z
Port-channel Ethernet Channel of interfaces
```

```
CISCO.3650.2005(config)#monitor session 1 source interface ?
FastEthernet FastEthernet IEEE 802.3
GigabitEthernet GigabitEthernet IEEE 802.3z
Port-channel Ethernet Channel of interfaces
```

```
CISCO.3650.2005(config)#monitor session 1 source interface g0/1
CISCO.3650.2005(config)#monitor session 1 source interface g0/1 ?
, Specify another range of interfaces
- Specify a range of interfaces
both Monitor received and transmitted traffic
rx Monitor received traffic only
tx Monitor transmitted traffic only
<cr>
```

```
CISCO.3650.2005(config)#monitor session 1 dest ?
interface SPAN destination interface
remote SPAN destination Remote
```

```
CISCO.3650.2005(config)#monitor session 1 dest interface g0/2
```

```
nexus_n5020(config)# monitor ?
session Configure session preferences
```

```
nexus_n5020(config)# monitor session ?
<1-18>
all All sessions
```

```
nexus_n5020(config)# monitor session 1 ?
<CR>
```

```
,
-
shut Shut the selected session
```

```
nexus_n5020(config)# monitor session 1
nexus_n5020(config-monitor)# ?
description Session description (max 32 characters)
destination Destination configuration
exit Exit from command interpreter
no Negate a command or set its defaults
shut Shut a monitor session
source Source configuration
```

```
nexus_n5020(config-monitor)# source ?
interface Configure interfaces
```

```

vlan      Vlan type
vsan      Vsan type

nexus_n5020(config-monitor)# source interface e1/2
nexus_n5020(config-monitor)# dest int e1/4
nexus_n5020(config-monitor)# exit
nexus_n5020(config)# exit

7148-2016(config)#mon ses 1 ?
destination  Mirroring destination configuration commands
source       Mirroring source configuration commands

7148-2016(config)#mon ses 1 source ?
Ethernet     Ethernet interface
Port-Channel Lag interface

7148-2016(config)#mon ses 1 source E
7148-2016(config)#mon ses 1 source Ethernet ?
$           end of range
<1-48>      Ethernet Port number

7148-2016(config)#mon ses 1 source et2 ?
,           extend list
-           specify range
both        Configure mirroring in both transmit and receive directions
rx          Configure mirroring only in receive direction
tx          Configure mirroring only in transmit direction
<cr>

7148-2016(config)#mon ses 1 source et2 both ?
<cr>

7148-2016(config)#mon ses 1 source et2 both
7148-2016(config)#mon ses 1 dest et4 ?
<cr>

7148-2016(config)#mon ses 1 dest et4

```

7.4 show monitor session

```

CISCO.3650.2005#show monitor session 1
Session 1
-----
Type           : Local Session
Source Ports   :
  Both         : Gi0/1
Destination Ports : Gi0/2
Encapsulation  : Native
Ingress        : Disabled

```

```

nexus_n5020# show monitor session 1
session 1
-----

```



```

type      : local
state     : down (Session admin shut)
source intf :
  rx      : Eth1/2
  tx      : Eth1/2
  both    : Eth1/2
source VLANs :
  rx      :
source VSANs :
  rx      :
destination ports : Eth1/4

```

7148-2016(config)#show mon ses 1

Session 1

Source Ports

Both: Et2

Destination Port: Et4

Appendix B – Raw test scores

Test #	Action	Type	Support		Syntax		Complexity		System Assistance	
			NXOS	EOS	NXOS	EOS	NXOS	EOS	NXOS	EOS
1.1	username / password	config	2	2	3	3	2	3	3	3
1.2	hostname	config	3	3	5	5	3	3	3	3
1.3	banners	config	2	2	3	3	3	3	4	3
1.4	default ip route	config	4	4	5	5	4	4	4	3
1.5	date / time	config	3	3	5	3	3	2	3	3
1.6	ntp	config	2	2	5	5	3	3	3	3
1.7	show version	diag	3	3	5	5	3	3	3	3
1.8	show running	diag	3	3	3	3	2	3	3	3
1.9	show users	diag	2	2	5	5	3	3	3	3
	Section average		2.7	2.7	4.3	4.1	2.9	3.0	3.2	3.0
2.1	show interface	diag	2	2	5	5	4	4	3	3
2.2	basic vlan configuration	config	3	3	5	5	4	4	3	3
2.3	vlan: configure an SVI	config	1	3	0	5	0	3	0	3
2.4	add an interface to a VLAN	config	3	3	5	5	2	3	3	3

2.5	show vlan	diag	3	3	5	5	3	4	3	3
2.6	create a trunk	config	3	3	5	5	3	3	3	3
2.7	show mac table	diag	3	3	1	2	2	3	3	3
2.8	configure flow control	config	4	4	5	5	2	3	3	3
2.9	show flow	diag	3	3	3	5	3	3	3	3
3.1	logging host	config	3	3	3	5	3	3	3	3
3.2	change log buffer size	config	1	3	0	5	0	3	0	3
3.3	create a snmp community	config	3	3	5	5	3	3	3	3
3.4	configure a snmp server	config	3	3	5	5	3	3	3	3
3.5	show snmp	diag	4	3	5	5	3	3	3	3
3.6	configure a TACACS server	config	3	3	5	5	2	3	3	3
3.7	Show tacacs	diag	2	4	5	5	3	3	3	3
4.1	Static IP routing	config	1	4	5	5	4	4	3	3
4.3	show ip route	diag	3	3	5	5	3	3	2	3
4.3	ip connectivity: ping	diag	3	3	3	3	3	3	3	3
5.1	configure static LAG	config	3	3	5	5	4	4	2	3
5.2	show int po	diag	3	2	5	5	3	3	3	3
5.3	Dynamic LAG using LACP	config	3	4	3	5	2	4	2	3
5.4	show lacp neighbor	diag	4	4	5	5	3	3	3	3
6.1	STP Interface: port cost	config	3	3	5	5	3	3	3	3
6.2	STP Interface: portfast	config	3	3	5	5	3	3	2	3
6.3	STP Interface: link-type	config	4	3	5	5	3	3	3	3
6.4	STP Interface: bpduguard	config	3	3	5	5	3	3	3	3
6.5	STP Local switch root primary	config	3	3	5	5	3	3	3	3
6.6	show spanning-tree	diag	3	3	5	5	3	3	3	3
6.7	MST: Create a MST instance	config	3	3	5	5	3	3	3	3
7.1	show ip igmp snooping	diag	3	4	5	5	3	4	3	3
7.2	configure a querier	config	3	3	3	5	2	3	3	3
7.3	configure mirror session	config	2	2	3	5	2	3	3	3
7.4	show monitor session	config	4	2	5	5	3	3	3	3

United States District Court
Northern District of California

π PLAINTIFF π

Case No. 14-cv-05344-BLF

Case Title Cisco Systems v. Arista Networks

Exhibit No. 488

Date Entered _____

By: Richard W. Wieking, Clerk
_____, Deputy Clerk